

Scanning - Shortwave - Ham Radio
Equipment - Computers - Antique Radio



Monitoring Times

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Scanning Corpus Christi

In this issue:

Russia's Domestic SW Stations
Radio Frequency Identification - Pro and Con

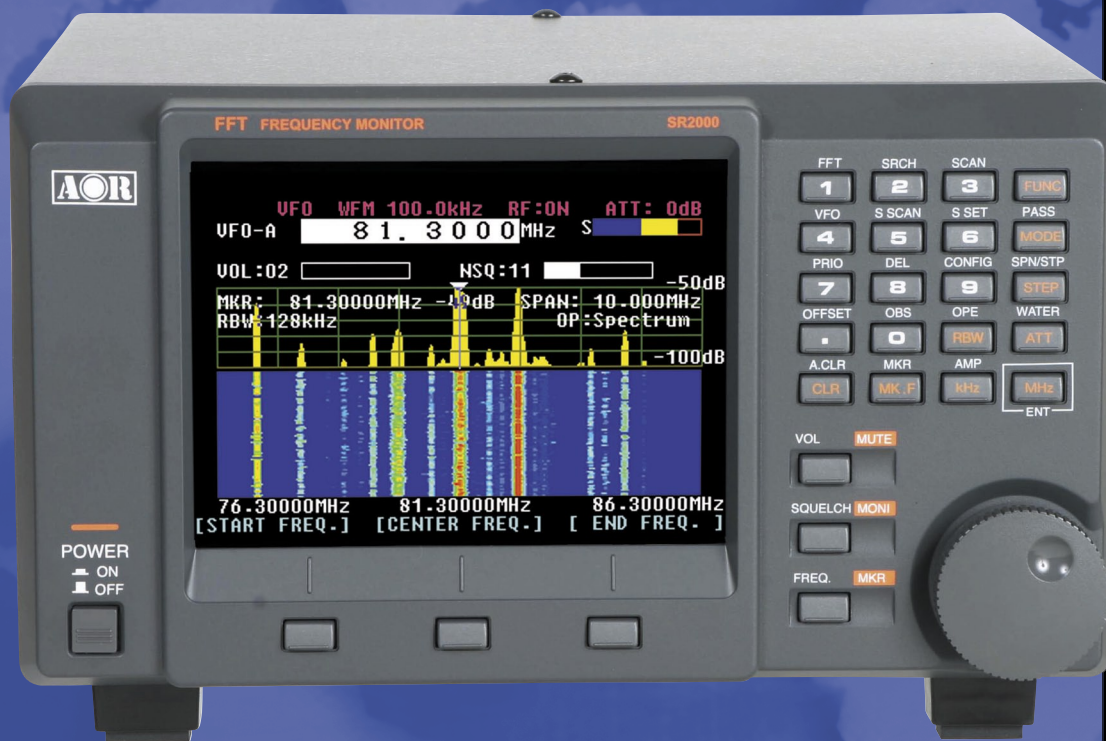
MT Reviews:

Back-Up Power Sources!
Tecsun's GR-138 Wind-Up Radio



AOR SR2000 Frequency Monitor

Seeing is Believing!



The SR2000 is an ultra-fast spectrum display monitor with a high quality triple-conversion receiver

AOR puts the power of FFT (Fast Fourier Transform) algorithms to work in tandem with a powerful receiver covering 25 MHz ~ 3 GHz continuous.

The result is a compact color spectrum display monitor that's ultra-sensitive, incredibly fast, yet easy to use. The SR2000 is perfect for base, mobile or field use and can also be used in combination with a personal computer. It's another example of why so many Federal and State law enforcement, military units, surveillance agencies, government users, hospitals, RF labs, News Media and monitoring professionals rely on AOR, the Serious Choice in Advanced Technology Receivers.

High Speed FFT Search
– Scans 10 MHz in as little as 0.2 seconds!
Instantly detects, captures and displays transmitted signals.

- FFT (Fast Fourier Transform) high speed display
- Displays up to 10MHz of spectrum bandwidth
- 5 inch TFT color LCD display
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- High speed FFT search quickly captures new signal transmissions
- Versatile color display uses state of the art digital signal processing
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- Frequency coverage: 25MHz ~ 3GHz (no gaps)
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SR2000

Standard Accessories:
AC adapter, control cables



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Tel: 310-787-8615 Fax: 310-787-8619
info@aorusa.com http://www.aorusa.com

Authority on Radio
Communications

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EXTERNAL OR INTERNAL?

The choices are yours at WiNRADiO.

The latest WR-G305 software-defined VHF/UHF receivers come in two versions: Internal PCI card and external USB box.

Which will you prefer, the convenience of being able to hide your PCI-based monitoring receiver inside your desktop PC, doing away with all the cables and clutter on your desk; or, on the other hand, the portability of your USB-based receiver, a great companion device for your laptop or notebook while travelling?



NEW!
APCO25 decoder
software now available!
See www.winradio.com
for more details.



WR-G305i receiver: No clutter on your desk

WR-G305e receiver: Portable and powerful

The WR-G305e (USB) and WR-G305i (PCI) are the first commercially available VHF/UHF software-defined scanning receivers. Their all-mode digital demodulator works entirely in software, with easy upgradability and high performance level typical of receivers costing many times more.

These receivers are designed for demanding applications where the ability to locate even the weakest signals in background noise and extract the cleanest possible audio is important. Their excellent hardware parameters and extensive software support define a new standard for communications intercept and monitoring tools.

- 9 kHz-1800 MHz frequency range (except cellular bands where required by law)
- Optional 3500 MHz downconverter
- Tracking front-end filters
- Dual-loop AGC and AFC
- Software-defined demodulation
- Excellent sensitivity
- Fast scanning speed
- Multiple squelch modes
- Real-time spectrum analyzer
- Sweeping spectrum analyzer
- Hit counter
- Accurate S-meter
- Adjustable IF bandwidth
- Adjustable digital audio filter
- Digital communications ready
- Digital Bridge™ compatible
- Standard PCI card or USB box
- Easy "Plug and Play" installation



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Cover Story

Scanning Corpus Christi

By John Mayson

A popular city and resort area, Corpus Christi is also home to oil refineries, a naval air station, and an army depot. You can still listen in on the busy EDACS trunked system, as long as it continues operating in analog mode. The system is capable of the digital ProVoice modulation which cannot be decoded by scanners.

The frequencies in this article will get you started scanning Corpus Christi and its surrounding counties before the move toward interoperability changes everything once again! Article starts on page 10. The cover photo of downtown is courtesy of the author.

C O N T E N T S

Radioslayton and other Radio Slang 13

By Richard O'Donnell

You can almost sense how much fun the early days of radio were, just by looking at the lingo that sprang up around the broadcasting industry. Try your hand at identifying some of these terms; some, like "disc jockey" made it into modern parlance. "Radioslayton" is one that didn't!

MT Visits with Larry Van Horn 14

Monitoring Times' assistant editor has a lot of experience under his belt -- most of it spent in researching frequencies and writing for **Monitoring Times** publications. If there was ever anyone hooked on the hobby, it's Larry. We talk with him about how he got started and what excites him most about the future of radio.

Domestic SW Broadcasting in Russia 16

By Bernd Trutenau

Regional shortwave stations in Russia have seen considerable shifts in response to the changing realities of the Russian economic and political scene. This article offers quick overview of what's expected for the winter season (B06) and a detailed schedule of operations. Included is contact information for all the stations listed.

Radio Frequency Identification 18

By Ken Reitz

High on the list of topics that can spark a lively controversy is RFID -- Radio Frequency Identification. This high tech hot button is another of those wireless solutions that promises to make life easier, safer, faster, etc., but at the potential expense of privacy, safety, identity, etc. See what the fuss is all about and form your own opinion.

Reviews

When the power fails this winter, you won't be at a loss for entertainment (or a flashlight) with the **Tecsun GR-138**, covering AM/FM and SW at a very inexpensive price (see page 68).

On the other hand, if the power goes out and you want to keep your refrigerator running and the lights on, as well as your radios, a wind-up generator isn't going to do the trick! This month's **On the Bench** column will help you decide what kind of a generator/back-up power system

is best for your situation, and some tips on what's involved in installing them (see page 66).

The **Milcom** column has been addressing satellite monitoring lately, and this month **Computers & Radio** picks up the ball. In addition to some quick advice on what you need to monitor the satellites, we found some great satellite help from the **HeavensAbove** website. We also review something called the **Digital Hotspotter** (see page 72).



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Iden Rogers.....	Planes	George Zeller.....	Outer Limits

hello earthlings!

E1

AM/FM-stereo/Shortwave Radio

- Frequency Coverage: 100-30,000 KHz, includes shortwave, medium wave AM broadcast band and longwave; 76-90, 87-108 MHz FM broadcast band
- Reception Modes: AM, FM-stereo, Single Sideband (selectable USB/LSB) and CW
- Digital Display: large 5.7 inch square, 240 x 320 pixel, dot matrix display. Shows all modes and selected functions
- Programmable Memories: 500 user programmable with alpha labeling plus 1200 user definable country memories, for a total of 1700
- Digital Phase Lock Loop (PLL) Synthesized Tuning with Direct Digital Synthesis (DDS) for drift-free frequency stability and finest tuning resolution
- Dual Conversion Superheterodyne Circuit: results in minimized interference through superior selectivity
- Excellent Sensitivity: yielding a true high-performance receiver
- High Dynamic Range: allowing for detection of weak signals in the presence of strong signals
- Selectable Bandwidths: 7.0, 4.0, 2.5 kHz for excellent selectivity



- Single Sideband Synchronous AM Detector: selectable USB/LSB or double sideband to minimize adjacent frequency interference and fading distortion of AM signals
- IF Passband Tuning: an advanced tuning feature that functions in AM and SSB. Greatly helps reject interference

E5

AM/FM/Shortwave Radio

- FM-Stereo, AM and Full-Shortwave Coverage (1711-29999 KHz).
- PLL Dual Conversion AM/SW Circuitry With SSB.
- 700 Programmable Memory Presets.
- FM Station Auto Tuning Storage (ATS).
- Alpha-Numeric Four Character Memory Bank Labeling.
- Tunes Via Auto-Scan, Manual-Scan, Direct Key-in Entry and Tuning Knob.
- Selectable 9/10 kHz AM Tuning Steps.
- Clock, Sleep Timer and Four Programmable Timers (for alarm or wake-up).
- Internally Recharges Ni-MH Batteries (batteries not included)..



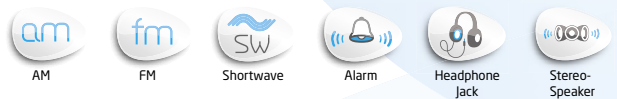
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The most powerful radio on the planet.

E10

AM/FM/Shortwave Radio

- FM Frequency Range: 87 - 108 MHz (For North America); 76 - 108 MHz (For Japan)
- Shortwave Frequency Range: 1711 - 29999KHz
- 9/10KHz step selector for Medium Wave (AM) reception
- 1/5KHz step for the display of Shortwave
- SW IF SET feature, shifts the intermediate frequency to minimize interference during shortwave reception
- Shortwave antenna trimmer
- ATS (Auto Tuning System) for the automatic memory storage of FM/MW stations
- Auto-Scan and manually scan stations stored into memory
- Fast/Slow tuning rate selection for manual tuning
- Snooze Function: 10 minutes, repeated three times

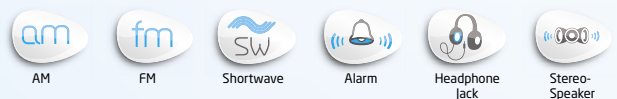


- FM Stereo/Mono selection
- High/Low Tone Control
- LCD Backlight With User Control
- Built-in Ni-MH battery charger
- System Set Codes

E100

AM/FM/Shortwave Radio

- Full featured Digital Tuner in extremely small size
- Shortwave - 1711-29.995 KHz
- FM 87.0 - 108.0MHz; MW 520 - 1710
- Manual and Auto-Scan Tuning
- Direct Keypad Frequency Entry
- Manual/Auto Scan to scan the preset stations
- Fine-tuning control knob
- 200 Random Programmable Memories
- 9/10KHz step size selector for correct worldwide medium wave (AM) reception
- FM-Stereo/Signal Strength/Power Level Indicators
- Built in antennas for AM, FM and SW reception



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WORLD RADIO TV HANDBOOK

WRTH 2007

After the success of our 60th anniversary edition we are now proud to announce the 2007 edition of the bestselling directory of global broadcasting on LW, MW, SW & FM

The Features section includes a further series of interviews with leading industry figures on *The Future of Radio* and a history of *Broadcasting in the Pacific*

The remaining pages are, as usual, full of information on:

- National and International broadcasts and broadcasters by country with frequencies, powers, languages, station addresses, email, web, phone and fax, leading personnel, QSL policy, and more
- Clandestine and other target broadcasters
- MW frequency listings by region
- International and domestic SW frequency listings
- International SW broadcasts in English, French, German, Portuguese & Spanish, listed by UTC
- Equipment reviews, *Digital Update* and more
- A new look at TV by country
- Reference section with Transmitter Site Location Table, Standard Time & Frequency Transmissions, DX clubs, Internet Resources, and much more

Available December 2006

SOME COMMENTS ON WRTH 2006

The most respected reference book in the radio hobby . . . *World Radio TV Handbook 2006* remains the authoritative source for every serious listener – *Gayle Van Horn, Monitoring Times, USA*

2006 *WRTH* is fully packed with information – *Wolfgang Bueschel, Germany*

WRTH 2006 is a worthy sequel in a tradition of high quality handbooks – *Michael Schaay, The Netherlands*

The 2006 edition is definitely the best and most comprehensive ever – *Richard Dixon, Radio Nederland*

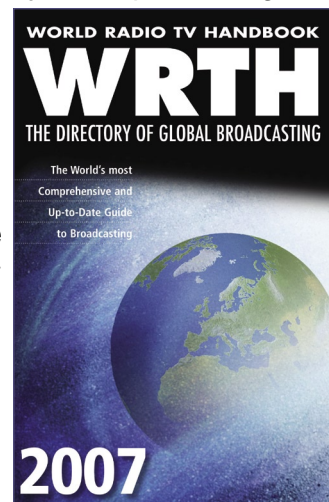
This 2006 edition really has outdone all previous ones. I do not know how a serious radio listener could be without the yearly *WRTH* and its online supplements, and I cannot imagine any radio professional doing without it – *Joe Analssandrini, Italy*

WRTH 2006 is very comprehensive, up-to-date and accurate and absolutely worth purchasing – *Anker Petersen, DSWCI*

The most accurate and complete edition of the *WRTH* I've ever seen – *Michael Schmitz, ADDX*

Congratulations upon the release of *WRTH 2006* – the quality is superlative! – *Adán Mur, Paraguay*

How can you improve a masterpiece? 2006 *WRTH* is magnificent! – *Howard Ragan, USA*





COMMUNICATIONS

"Communications" is compiled by Editor Rachel Baughn KE4OPD from newspaper clippings from these fine contributors: Anonymous, Joe Craig, Norman Hill, Tomas Hood, John Figliozzi, HL4, Bart Lee, John Mayson, Ken Reitz, Doug Robertson, Larry Van Horn.

AMATEUR RADIO

Amateur Volunteers

American Red Cross Background Checks

Amateur Radio Emergency Service (ARES) members who support American Red Cross disaster relief and recovery efforts often have to badge in as Red Cross volunteers. The ARC recently clarified its new policy that all volunteers must now give written permission for background checks, including credit checks.

Concern was widespread in the ham community about agreeing to credit checks and also about the fact that ARES members supporting the ARC were considered to be ARC volunteers.

The ARC believes the background checks are necessary in order to regain the trust of the American people, but clarifies that most volunteers will only receive the minimum routine check to confirm their Social Security number and conduct a search of the National Criminal File. Credit checks will be performed only in rare instances.

ARRL Field and Educational Services Manager Dave Patton, NN1N – whose department supports and oversees the ARRL Field Organization – believes the Red Cross stands to lose a fair number of volunteers because of the requirement – and not necessarily just ARES volunteers.

You Know the Drill...

One of the original purposes of the American Radio Relay League was the establishment of a nationwide amateur network to handle messages. This *National Traffic System* still runs 365 days/year thanks to the support of net managers and traffic handlers. Daily practice with routine messages builds operating skills and keeps the NTS machine greased and ready for the next disaster. Reporting these statistics to the ARRL helps to build the case for amateur radio.

Public Service Activity Report Online

Each year, hams donate thousands of person hours of supplementary public service communications in civil emergencies, official drills and events such as parades and marathons. Such events show Amateur Radio in its best light, and it is critically important that ARRL bring documentation of this public service work to the attention of the Congress, the FCC and other public officials. When you have a public service event, follow up with a report to ARRL Headquarters. The form can be completed online at: www.arrl.org/FandES/field/forms/fsd-157-online-form.php

Ham Radio Song and Dance

Ed Yeary W4TEY forwarded the following web site for another great song video by the Hamband at:

www.youtube.com/watch?v=fAOOd48j6WA

The OZ1ADL/OZ5E contest station, "with lots of famous guest operators," sings about the trials and tribulations of 48 hours of operation (What contest? See more on www.oz1adl.com)

BROADCASTING

Broadcasters Support BPL

Court Appeal

The Association for Maximum Service Television (MSTV) and the National Association of Broadcasters (NAB) have filed a joint motion for leave to intervene in support of the ARRL in its court appeal of the Federal Communications Commission's Broadband over Power Line (BPL) rules.

The motion states: "MSTV and NAB believe that the regulations under review are arbitrary, capricious, and contrary to law, and will adversely impact their members by, among other things, permitting unlicensed users of radio spectrum to interfere with licensed uses of the spectrum."

As expected, some BPL proponents are seeking to intervene on the side of the FCC.

Kenya Demands Reciprocal Agreements

Kenya says it could halt broadcasts by foreign radio station in Kenya, if reciprocal licenses are not granted.

Assistant Information Minister Koigi wa Wamwere said, "If we are allowing BBC to broadcast in Kenya, KBC (Kenya Broadcasting Corporation) should also be in London." Likewise, KBC should also be allowed to broadcast in Washington and Beijing, he added, as Voice of America and Radio China broadcast in Kenya. He said a refusal to reciprocate would be treating Kenyans "like idiots."

"So they should either give us a license in London or go."

TDP Radio Celebrates Three Years

TDPradio, the brainchild of Daniël Versmissen (Program Manager) was founded in 2003. TDPradio is the first and only dance radio station which broadcasts worldwide in DRM (Digital Radio Mondiale), shortwave stereo to Europe and North America.

Its mission is to bring the best audio quality on shortwave, utilizing only digital technologies from production to audience with the smallest number of encoding/decoding steps possible in the digital transmission chain. TDPradio also aims to offer unique, compelling content produced especially for DRM to promote the possibilities and quality of DRM.

Broadcasts take place daily from 1500-1600 UTC on 6015 kHz to Europe and from 0000-0100 UTC on 9790 kHz to Northern America. Each day a different flavor of dance music is broadcast to suit different tastes. You can also listen online 24/7 to the live internet stream. Check out www.tdpradio.com for more details. TDPradio is still looking for DJ talent!

New DRM Yahoo Group

Avid DRM listener Christopher Rumbaugh has started a new DRM North America Yahoo group, and he's hoping to get other devoted DRM monitors to join up. For more information, go to: <http://groups.yahoo.com/group/drmna/>

Online Audience

KCRW, a public radio station in Santa Monica, now reports that its online streaming audience exceeds its airplay audience. The *Wall Street Journal* noted that the growth of the station's podcast audience has resulted in some "listeners" who are not even aware that it is a radio station broadcast.

NEW TECHNOLOGY: RFID

Cloning a Card

No matter how safe radio frequency identification (RFID) cards are claimed to be, "It's relatively simple to clone the cards," says Chris Paget, Director of Research for IOActive, a computer security company in Seattle. Paget and his engineers were able to create a portable RFID reader from off the shelf parts purchased at a local electronics store for around a hundred bucks.

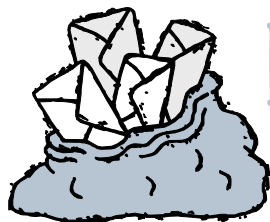
The homebrewed reader was connected to a laptop that was running software IOActive wrote specifically for this project. The reader and laptop were placed inside a regular computer bag.

Outside, on a busy street corner, Paget was able to read the author's building security badge that was in his pocket as he stood on a street corner. The reader was only six inches away, but on a busy street Matt Markovich says would have never thought twice about a guy with a laptop bag next to him. It took just a matter of seconds.

Implant Ban

In June, Wisconsin became one of the first states to ban the forcible implantation of radio frequency identification (RFID) tags into humans. The act dictates that no person may force another to have a microchip implanted in his body. Violators face fines of \$10,000 each day until the chip is removed.

A spokeswoman for Doyle said the law targets RFID technology, though it bans the implantation of any microchip without consent.



LETTERS TO THE EDITOR

More Kudos

"Just a note to say I enjoy reading *Monitoring Times* – The September issue with Joe Cuhaj's 'Around the World in 48 Hours - A Shortwave Century Weekend' was great. I'm 66 years old and have been SWling (former WPE9LM) since high school days and years later scanning. Have dozens of shortwaves and homemade antennas. I sure do enjoy your magazine and keep them all.

"Wish I had saved all of my old QSL cards and log books over the years."

– Jim Dawson, Muncie, IN

"Thanks (to Jim Clarke) for the great article about your radio history. ('The Magic of Radio,' September page 66). My hobby followed a similar path, although I was always a SW listener, never a ham. Recently I got my ham license, and was looking for a rig. Your words (and those of others) about the IC-756ProIII cemented my resolve to buy that radio. I had been comparing rigs over the last few months, determined to reward myself when I made Extra. Last weekend at a VE test site in Nashville I made Extra; four days later I had my 756P3.

"What a great radio, and I agree, the spectrum scope is a winner. It does bring back some of the feel of the old days (my teenage years were spent with a surplus BC-342-N). 'Seeing' the stations is similar to watching the graph dial, and it is easier for me to navigate back to an interesting station than simply remembering the frequency when I am idly roaming a band.

"Thanks for the great report, and I hope your interest remains and the magic sustains. It is back for me as well!"

– Dave Matthews KI4PSR

"Just wanted to tell you (Jim Clarke) how much I enjoyed your article, 'The Magic of Radio.' You said you were 10 years old in 1970. I was 10 in 1953 and radio was a big part of my growing up. I always had a radio beside my bed and would listen to the old radio shows. At that time a friend from school and I would build crystal radios. What a thrill to hear the local radio station. His father had an SX-42 receiver in his den. You can bet every time he was away we were in there at the radio.

"At first we only had our AM radios to listen to. Just hearing out of state stations was a big thing. About 1956 I got my first shortwave radio, a Hallicrafters S-38E. I think I tuned around until I got blisters on my fingers. So, to make a long story short, we are now in our early 60s and we both have our general tickets.

"I do agree with you the thrill of radio has gone. I do have one analog dial transceiver, a 1975 Kenwood. I forgot to say, my grandfather had a Zenith floor model radio, the one with the green eye and all those short wave bands, and when he got his new AM and FM radio I got

the Zenith. You would have thought I hit the jackpot. Thanks for a great article.

"Just a side note, I have all my short-wave listening and amateur log books

from 1956, I can't believe some of them are 50 years old..."

– Don House WA3OWD

Johnnie Craig's article on "Swan Island, Visitors Unwelcome" in the October 206 issue was a smash hit. Terry Bartoli, K5TLB, said "I can say only one thing: Johnnie your friends are right! You need to write a book. And sign me up for a copy right now." Jim McCulloch and Jim Stellem said they'd also buy the book. John Mayson said, "I must say it was probably the most interesting article I've read in the magazine, and I've written several myself! Yes, you should write a book. I'll buy the first one."

The following kudo goes to Larry Van Horn, who is the responsible party! "I downloaded and printed out the 'Monitoring NASA and Space Communications' pdf file from your website and WHAT A BEAUTIFUL JOB you have done with it. I really appreciated the color aspect that you used throughout the print and the pictures. Nothing but excellent."

– Bob Olmstead, St. Paul, MN

Ramsey Aircraft Monitor

(Reviewed by Bob Grove in the November MT)

"I wrote to two airlines that I fly on requesting information about using the Ramsey ABM1 Aircraft Monitor onboard their aircraft.

"American's reply: 'At this time, radios of any kind are among those items that may never be used on our aircraft.' Then they said that they like to consider their services from the customer's perspective, and so my letter was useful.

"Southwest forwarded my letter and the Ramsey web site to their Safety and Federal Airport Security department for review.

"The answer is 'that the device you inquired about is considered a scanner, which cannot be used while the aircraft is in flight.'

"I thank American and Southwest airlines for their research and response."

– William Tobin, Albuquerque NM

"I just read your review of the Ramsey Air Band Monitor and had a few ideas to pass along based on your suggested improvements at the end of the article.

"I agree that a milair capability would be great. I would suggest that it be available in some form as a separate receiver or channel. This would allow the listener to feed one ear from each band, civil/VHF and mil/UHF. Given the lack of discrimination in frequency otherwise possible in such a receiver, this could be a way to allow some sorting out by the user of what is going on. It's possible that this could be either a stand-alone unit, a simple switch for choosing between bands (least preferred), or

(ideally) packaged as a dual-channel receiver, feeding each ear with a different band through a set of stereo-converted-to-mono headphones.

"I note this because the Air National Guard locally seems to use a variety of VHF channels, officially or unofficially, that are more difficult to keep track of. Some I have, but this could allow me to verify if I'm missing something in my current freq coverage by listening for traffic not programmed into my airband scanners.

"This of course leads to the question of whether the ABM would be compatible with the RF rich environment of the typical monitoring shack, of course, but it is one way it might be useful with a little creative thought even if this is a potential problem. One could always step outside and away from possible interference for a moment to listen with it, if need be I suppose, if you were alerted about local traffic in the area on known freqs."

– Mike Lehman, Urbana, IL

Controlling the R8B

"Though I don't have the R8B radio, I read with delight the article by Terry Pack about controlling the R8B with Windows from the command shell. May I suggest a couple of things to make it easier. One, hold down the

NAME THE COVER STORY CONTEST!

What was the cover story for Volume 1 Issue 1 of *Monitoring Times*?

The Grand prize of a *LIFETIME* subscription to *Monitoring Times* will be awarded to one person whose name is drawn from those with the correct answer. All entries, whether correct or not, will be entered for the First* and Second Prize drawings. Contest deadline: January 15, 2007

Grand Prize: Lifetime subscription to MT

First Prize: Kinetic Avionics SBS-1 Virtual Radar

Second Prize: MT Anthology on CD 1999-2005

Sorry: no email entries will be accepted. If you don't know the answer to the question, you can enter anyway. Send your entry in a letter or on a postcard, including your NAME, MAILING ADDRESS, and your EMAIL or PHONE number, to:

MT 25th Anniversary Contest
7540 Hwy 64 West
Brasstown, NC 28902

* *Monitoring Times* is very grateful to ENIcomm for its generous gift. Please visit their site at www.ENIcommunications.com

Windows key and press the pause/break key. Click on the hardware tab, Device Manager button, and ports. Then double click the COM port connected to the radio, click the port settings tab, and set your COM settings permanently there. If I remember correctly, you will have to reboot Windows. That gets rid of one batch file (com.bat) and speeds things up ever so slightly.

"Then instead of a batch file for each memory and program you want to record, you just need one batch file. It could look like this:

```
@echo off
rem R8B.bat
cls
if %1!!=!! goto HELP
C:
cd "\R8B MEM FILES"
if not exist %1.txt goto NOFILE
print com1 %1.txt
goto END
:NOFILE
echo There is no such file %1.txt
goto END
:HELP
echo You must specify a parameter such as
000, 012, etc.
goto END
:END
cd \
```

"Then you simply specify which memory file you want to use on the command line minus the .txt. Like this:
C:\>r8b 000

"You can get more elaborate with multiple memory channels listed on the same command line and using the "for" statement, but the above listing will eliminate trying to keep track of all the many batch files one could collect for each memory. Happy batching.

- Terry Schima

Beacon Hunting

"While in Miscou we heard an NDB on 410 kHz with the ID: LF8A.

"So far we have been unable to find an ID for this beacon. Are there any MT readers who can ID this beacon?

"Thanks and best regards,

- Jacques d'Avignon

One of my coworkers (Mr. Brian Justin, WA1ZMS/4) recently installed a HIGH-powered 2 meter beacon atop Apple Orchard Mountain (elevation 4,300 feet / 1,310 meters)

144.2850 MHz

CW Mode

1,400 watts ERP

Beam Heading 60 degrees (pointed towards UK/Europe)

ID = WA1ZMS/B

The purpose of this beacon is to monitor the path between the USA and the UK for a band opening on 2-meters. We have received reports so far from New England, Cape May (New Jersey) and Northern Georgia (off the back of the beam!).

- Mark A. Cobbeldick, KB4CVN

New MT Readers Website

This month we initiate a new section of the monitoringtimes.com website which is for readers only. When you go to our home page and click on the **MT Readers Only** link, you'll be prompted for a username and password. The user name will always be "mtreader." The password will be changed monthly and will appear in different locations in the magazine each month. It will always be accompanied by the graphic below:

The password for January is:
km76xvrz

Remember the contest announced on page 9 of the December 2006 issue - It's not too late to participate!



This page is open to your considered comments. Opinions expressed here are not necessarily those of Monitoring Times. Your letters may be rephrased or shortened for length and clarity. Please mail to Letters to the Editor, 7540 Hwy 64 West, Brasstown, NC 28902, or email editor@monitoringtimes.com

Happy monitoring!

- Rachel Baughn, KE4OPD, Editor



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Scanning Corpus Christi, Texas

By John Mayson

We've all heard the cliché that everything is bigger and better in Texas. Both points are hotly debated, but no one can argue that Texas is home to many large cities. Of the top ten largest cities in the country, three are in Texas and Texas is the only state to boast three cities with populations over one million people. Some of Texas' smaller cities tend to be forgotten by nonresidents, but they are still an important part of the state. Not only are many folks proud to live there, but they offer the traveler days full of wonderful activities. One such city is Corpus Christi, Texas.

Corpus Christi, often simply referred to as "Corpus," is a coastal city of a little more than a quarter-of-a-million people. The name is Latin for "Body of Christ," and it's the county seat for Nueces County. Hollywood stars such as Lou Diamond Phillips, Farrah Fawcett, and Dabney Coleman have all called Corpus home. The city is home to the Texas State Aquarium, the *USS Lexington* Museum, a number of museums, nice beaches, and it is the gateway to Padre Island National Seashore. Tourism and oil are the principal industries. Corpus is also home to a Naval Air Station and Army Depot.

The city of Corpus Christi has the capacity to use an analog or ProVoice digital EDACS trunked system. Virtually every trunk tracking scanner in existence can track this system, but none can decode the ProVoice modulation. Thankfully the city has so far restricted itself to analog.

Corpus Christi

The city maintains a three-site EDACS trunk radio system (TRS) that hosts all city agencies, plus some county and other area agencies. Table 1 lists the sites with their frequencies. As always,

you must program the frequencies into your scanner in the exact order listed for tracking to work correctly.

Table 1. Corpus Christi TRS Frequencies

Robstown (Western County)

01=856.2375
02=856.7125
03=857.2375
04=857.7125
05=858.2375
06=858.7125
07=859.2375
08=859.7125
09=860.2375
10=860.7125
11=854.9875
12=855.4875
13=855.9875
14=855.7375
15=857.4875 MHz

Shoreline (Downtown)

01=856.4375
02=856.9375
03=857.4375
04=857.9375
05=858.4375
06=858.9375
07=859.4375
08=859.9375
09=860.4375
10=860.9375
11=854.9625
12=855.2125
13=855.4625
14=858.7625
15=859.7625 MHz

Flour Bluff (South)

01=866.0875
02=866.7500

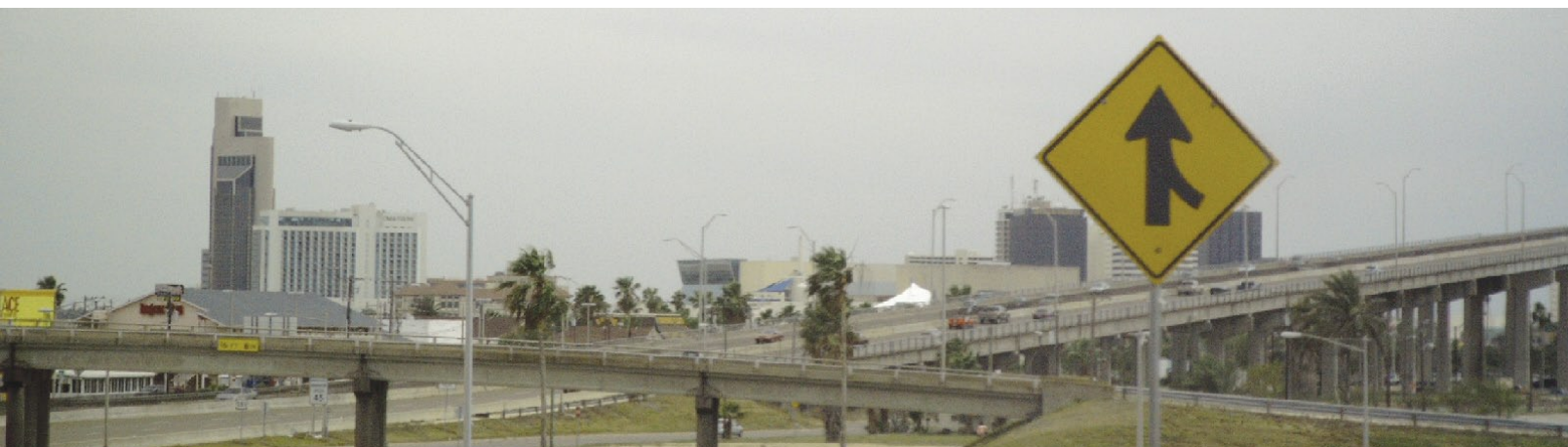
03=867.1125
04=866.2750
05=866.4375
06=867.6625
07=868.2375
08=868.4250
09=868.5875
10=868.8375 MHz

Let's take a look at who's using this system. In the name of saving paper, we will list only the agencies of most interest to our readers – namely law enforcement, fire, EMS, and other "action" agencies.

Corpus Christi Police Department

The CCPD keeps a watchful eye over the citizens of their city. They are organized into four districts (see Diagram 1). Each of the four districts is divided into a number of beats. (DEC=decimal; AFS=Agency/Fleet/Subfleet)

DEC	AFS	Description
273	02-021	Patrol Districts A & D
274	02-022	Patrol Districts B & C
275	02-023	Patrol 1 Car to Car
276	02-024	Patrol 2 Car to Car
277	02-025	Patrol field supervisors
287	02-037	Crime scene and identification division
289	02-041	Patrol Districts A & B (Night)
291	02-043	Patrol 3 Car to Car
293	02-045	Upper level Patrol Supervisors and admin supervisors
305	02-061	Traffic Division
307	02-063	Traffic Division car-to-car
337	02-101	Special Services
339	02-103	Vice
349	02-115	Juvenile
353	02-121	Special events
359	02-127	Training academy scenarios
361	02-131	TAC-9



362 02-132 TAC-10
 382 02-156 City Marshal Service-1
 383 02-157 City Marshal Service-2
 385 03-001 Warrant and Registration checks
 386 03-002 Warrant and Registration checks (Nights)
 388 03-004 DARE & Crime Watch
 393 03-011 Dive Team
 737 05-121 SWAT 1
 753 05-141 Vice

Corpus Christi Fire Department

Who'd have thought back in 1871 that the Pioneer Hose Company #1 would grow into the largest fire department in south Texas?

DEC	AFS	Description
529	04-021	Fire Department Dispatch
530	04-022	Fire Incident Command
531	04-023	Fire Incident Command
532	04-024	Fire Incident Command
533	04-025	Fire Incident Command
534	04-026	Fire Incident Command
535	04-027	Fire Incident Command
536	04-030	Fire Incident Command
537	04-031	Fire Incident Command
538	04-032	Fire Incident Command
539	04-033	Fire Incident Command
562	04-062	Fire Chief
563	04-063	Fire Admin
564	04-064	Fire Private
565	04-065	Fire Mobile
566	04-066	Fire Maintenance
567	04-067	Fire Prevention
1305	10-031	Fire Services Command/Dispatch
1306	10-032	Fire Services
1307	10-033	Fire Services
1308	10-034	Fire Services

Corpus Christi EMS

DEC	AFS	Description
545	04-041	EMS Dispatch
546	04-042	Medical Incident Command
547	04-043	Medical Incident Command
548	04-044	Medical Unit-to-Unit
549	04-045	EMS Supervisors
550	04-046	Lifeguards
1040	08-020	EMS mutual aid
1041	08-021	Spohn-Memorial Medical Center
1042	08-022	Spohn Shoreline
1043	08-023	Spohn South
1045	08-025	Driscoll Children's Hospital
1046	08-026	Doctors Regional Hospital
1047	08-027	Bay Area Medical Center
1309	10-035	EMS Command
1310	10-036	EMS TAC 1
1311	10-037	EMS TAC 2
1312	10-040	EMS TAC 3

The City of Corpus Christi operates this trunk radio system, but there are several non-city agencies operating on it.

Nueces County Sheriff

The NCSO provides law enforcement for unincorporated areas of the county and also run the county jail. They have several talkgroups on the city system. Nueces County does have its own trunk radio system, but as of press time it's not being used by NCSO.

DEC	AFS	Description
1569	12-041	Primary Dispatch
1516	11-134	Back Channel
1526	11-146	Back Channel
1570	12-042	Car-to-Car
1570	12-042	Back Channel
1573	12-045	Field Supervisors
1575	12-047	Detectives
1602	12-082	Information
1606	12-086	Car-to-Car

Nueces County Constable

Texas not only has sheriffs, but constables as well. Much like sheriffs, constables have deputies who wield all the enforcement powers of Texas peace officers. They are sometimes referred to as the executive office of the justice of the peace courts. Their duties include: subpoena witnesses, act as bailiffs, execute judgments, and process service. The larger area constables may also perform patrol duties and investigate crimes.

DEC	AFS	Description
1576	12-050	Precinct 1
1592	12-070	Precinct 1 Car-to-Car
1583	12-057	Precinct 2
1599	12-077	Precinct 2 Car-to-Car
1578	12-052	Precinct 3
1594	12-072	Precinct 3 Car-to-Car
1582	12-056	Precinct 4
1598	12-076	Precinct 4 Car-to-Car
1580	12-054	Precinct 5
1596	12-074	Precinct 5 Car-to-Car
1609	12-091	Precinct 6
1597	12-075	Precinct 6 Car-to-Car

Naval Air Station Corpus Christi

The US Congress authorized the construction of NAS Corpus Christi in 1938 to help the Navy meet the demand for pilots. Three years later on May 5, 1941, she saw her first graduating class. In June 1943 NASCC graduated her youngest cadet ever, a pilot by the name of George H. W. Bush.

Today, NASCC's primary assignment is

pilot training. The best aviators train here for 18 months before moving on to their duty stations.

The United States Coast Guard (USCG) and Corpus Christi Army Depot (CCAD) are two tenants at NASCC.

DEC	AFS	Description
1809	14-021	Police
1810	14-022	Police 2
1811	14-023	Police 3
1815	14-027	Fire
1816	14-030	Fire 2

NASCC does actively use the city's TRS, but maintains many conventional frequencies as well.

Frequency	PL	Description
141.100		NASCC Tower
139.575		NASCC Police
143.725		NASCC Flight Support Operations
140.525		NASCC Admin & Safety
140.675		NASCC Hurricane Net
140.700		NASCC Power Distribution/Public Works
141.000		NASCC Base-wide Common
142.850	167.9	NASCC Police Administration/Investigators
149.100		NASCC Emergency Vehicle Operations Training, Safety Observers
149.375		NASCC Hospital EMS Paging
138.700		NASCC Hospital Maintenance/Security/Administration
140.700		NASCC Hospital Operations/Maintenance
140.600	167.9	NASCC Cabines Field Operations
140.725	167.9	NASCC Waldron Field Operations
152.975		NASCC Flight Line "Fuel Farm" Operations Contractor
139.500		NASCC FD
142.550		NASCC Housing Maintenance Contractor
141.100	100.0	CCAD Security Primary
141.400		CCAD Security
143.100		CCAD Security

If you are a milair (military aviation) buff, Corpus Christi is a great place to be!

Frequency	Description
118.700	NASCC Ground
134.850	NASCC Tower

The USS Lexington, a museum open to the public.



139.200	NASCC Fuel
140.325	NASCC Air ADVS
233.700	NASCC Approach
264.400	Waldron OPS
282.000	NASCC SAR
299.600	Cabaniss OPS
307.900	NASCC Primary Departure
307.900	NASCC Tower
314.800	NASCC Clearance
340.200	NASCC Tower
343.500	NASCC Emergency
348.000	NASCC Tower
348.725	NASCC Primary Approach
360.200	NASCC Tower
385.600	NASCC Tower
381.800	USCG Rescue
49.700	CCAD
139.200	CCAD Helos
386.600	CCAD Helos
282.425	US Customs Service



Everyone Else

Before we move on to surrounding counties, let's take a look at who else is using the Corpus Christi TRS.

DEC	AFS	Description
1553	12-021	Robstown PD
1554	12-022	Robstown PD
1649	12-141	Portland PD (Link to 155.190 MHz)
1650	12-142	Portland PD Channel 2
1665	13-001	Corpus Christi ISD PD
1666	13-002	Corpus Christi ISD PD
577	04-081	Flour Bluff VFD Admin
578	04-082	Flour Bluff VFD Dispatch
593	04-101	Annaville FD
594	04-102	Annaville FD
595	04-103	Annaville FD
596	04-104	Annaville FD
609	04-121	Refinery Terminal FD Dispatch
610	04-122	Refinery Terminal FD Ops
611	04-123	Refinery Terminal FD Supervisors
612	04-124	Refinery Terminal FD Ops 2
613	04-125	Refinery Terminal FD
614	04-126	Refinery Terminal FD
615	04-127	Refinery Terminal FD
616	04-130	Refinery Terminal FD
2046	15-156	Refinery Terminal FD Link
1699	13-043	USCG Interdiction Teams
756	05-144	US Customs Service

Aransas County

Aransas County is northeast of Corpus Christi. At present time no one in the county uses a trunk radio system.

Frequency	PL	Description
155.430	167.9	Aransas County Sheriff
154.400		Volunteer Fire Dispatch/Operations
158.805	167.9	Volunteer Fire Dispatch/Operations
155.400		EMS Paging
155.610		Aransas Pass PD
155.250	167.9	Rockport PD
164.625	131.8	Aransas National Wildlife Refuge

Jim Wells County

This county is named after James Babbage Wells and can be found west of Corpus Christi. Like Aransas County, Jim Wells has not switched to a trunk radio system.

Frequency	PL	Description
155.640	167.9	Jim Wells County Sheriff
155.820	167.9	Alice PD
155.415	167.9	Alice PD

Kleberg County

Kleberg County is located south of Corpus Christi and includes the north end of Padre Island. Kleberg County operates an EDACS trunk radio system. According to RadioReference.com, Corpus Christi, Nueces County, Kleberg County and San Patricio County will merge their systems in a single, wide-area radio network. From an interoperability standpoint this is exciting news. The downside is that the same source says all law enforcement communication will use ProVoice, making it unmonitorable.

Table 2. Kleberg County TRS Frequencies

01=866.0500
02=866.4000
03=867.0500
04=867.4000
05=868.0500 MHz

DEC	AFS	Description
1873	14-101	Kingsville PD Primary
1874	14-102	Kingsville PD Secondary
1887	14-117	Kleberg County Sheriff Primary
1888	14-120	Kleberg County Sheriff Secondary
1890	14-122	Texas DPS Unit-to-Unit
1905	14-141	Kleberg County Fire Primary
1906	14-142	Kleberg County Fire Secondary

Kleberg County hosts its own naval air station, NAS Kingsville. You can find some conventional activity along with some great MILAIR.

Frequency	Description
140.350	NAS Kingsville Shore Patrol
141.950	NAS Kingsville Airfield Operations/Tower
142.000	NAS Kingsville OPS-1
142.150	NAS Kingsville OPS-2
142.550	NAS Kingsville Crash

Frequency	Description
276.200	NAS Kingsville ATIS
352.400	NAS Kingsville Ground
124.100	NAS Kingsville Tower
346.000	NAS Kingsville Tower
266.800	NAS Kingsville Departure
300.400	NAS Kingsville Approach
328.400	NAS Kingsville Clearance
274.800	NAS Kingsville Base Ops
119.900	NAS Kingsville Radar
300.400	NAS Kingsville Radar
352.400	NAS Kingsville Guard
302.600	NAS Kingsville Gunnery Range Strike OPS
327.820	NAS Kingsville Gunnery Range TAC A
251.600	NAS Kingsville Gunnery Range TAC B
313.000	NAS Kingsville Gunnery Range TAC C
337.000	NAS Kingsville Gunnery Range TAC D
118.350	NAS Kingsville Gunnery Range TAC E
128.450	NAS Kingsville Gunnery Range TAC F
384.400	NAS Kingsville Gunnery Range Target Tow
358.000	NAS Kingsville Gunnery Range Target Tow Alternate
308.200	NAS Kingsville Gunnery Range VFR Alert
301.000	NAS Kingsville Gunnery Range Yankee Range
320.400	NAS Kingsville Gunnery Range Sea Gull OPS

San Patricio County

San Patricio County is located north of Corpus Christi. They use an EDACS trunk

radio system and is one of the counties quoted on RadioReference.com as being interested in forming a wide-area public safety radio network. The system has three sites within the county.

Table 3. San Patricio County TRS frequencies

Sinton
01=866.2375
02=866.9250
03=867.2375
04=867.9250
05=868.9250 MHz
Ingleside
01=866.1500
02=866.7125
03=867.1500
04=867.7125
05=868.7125 MHz
Mathis
01=866.4625
02=867.4625
03=868.4625 MHz

DEC	AFS	Description
299	02-053	Aransas Pass Police
1936	15-020	Emergency Broadcasts
1937	15-021	Sheriff Primary/Dispatch
1938	15-022	Sheriff Secondary
1939	15-023	Law Enforcement Common
1940	15-024	Sheriff Administration
1943	15-027	Taft Police and Emergency Services
1949	15-035	Aransas Pass Police
1951	15-037	Mathis Emergency Services
2033	15-141	All Agency Common
2036	15-144	Aransas Pass Police
2041	15-151	Texas DPS Unit-to-Unit

Now, in case you're probably thinking we here at *Monitoring Times* couldn't possibly offer you any more military frequencies, you're wrong. Following are frequencies for Naval Air Station Ingleside!

Frequency	CTCSS	Description
148.650		NAS Ingleside FD
143.400	103.5	NAS Ingleside PD Primary
143.450		NAS Ingleside PD
140.150		NAS Ingleside PD
142.550		NAS Ingleside PD
141.450		Port Operations

Nueces County

We'll wrap up back in Nueces County, home of Corpus Christi. This system is on the air, but for all intents and purposes, is not being used. Perhaps someday soon it'll be part of the wide-area radio network.

Table 4. Nueces County TRS Frequencies

1=866.1250
2=867.0875
3=868.1500
4=866.3750
5=866.7000 MHz

We're done! If you find yourself longing for warm tropical waters, sandy beaches, and enough frequencies to choke your scanner, head on down to Corpus Christi. It's a beautiful city and a great place for vacation. And if you do head down, be sure to pack your laptop computer. The city offers free municipal wifi! Visit www.cctexas.com/wifi/ for more information.

Radioslaytion and other Radio Slang

By Richard W. O'Donnell

What is Radioslaytion?

In the old days, that is what they used to call a radio station that did a poor job of transmitting its signal. Even today, we still have too many Radioslaytions around.

How about *Radioite*? That's another way of saying you are a radio buff. *Radiator* is a speech delivered over the airwaves, and *Radiator* is the speaker who delivers it. And you have *Radioitis*, if you turn on your radio, and leave it going all day.

Modern radio workers and radio fans, as well, may have their own slang, but the language used during the early years of the industry was far more interesting and a lot more fun.

Let's test your memory, and see how much vintage radio lingo you can recall. We'll warm-up with some easy ones. For example, how about *Airways*? That's the same as airwaves, or radio broadcasting.

How about *Canned Music*? Before CDs and cassettes came along, that is what they used to call music on records. *Platters* meant the same thing. *Disc* was also another name for a phonograph record. *Disc Jockeys* used to play them all the time.



For the record – no pun intended – *Canned Speech* was a talk recorded on a Disc, in advance of the broadcast. Religious programs often took advantage of Canned Speech, because, in many cases, they were unable to find permanent spots on the Sunday morning radio schedules, which were jammed with religious programs. The programs came on at different times in different cities.

Continuity was all that talk you heard between musical numbers, whether popular or classical. It was a bridge between the selections. A *Waxed Library* was where they kept all those Platters.

Web was a radio network. A *Warbler* was a popular singer, usually male. Warbler fans all across the land could not see their favorite's face, so they conjured up their own magnificent images, only to have them crushed when they came across a photograph of the singer. Many a popular Warbler would

never make it on television.

Unwind The Stanza was a soap opera term. It meant to complete a week of shows.

What was *Timecasting*? That was when the announcer came on between shows, at the half-hour, and gave the correct time, right down to the exact second. *Tub-thumping* was advertising over the air. *Tomtoming* meant the same thing. So did *Blurbing*, *Drum Beating*, *Ether Bally* and *Hullabaloo*.

What was *Paycheck*? That was the advertiser who paid for all that Ether Bally you heard over the Airways.

A *Newscaster* was the announcer who read the news. An *Air Spellbinder* was an effective announcer, or speaker. A *Blaster* was a radio broadcaster. So were *Etherer*, *Mikester*, *Sound Tosser*, and *Word Slinger*.

Rettysnitch was a mythical instrument of torture that was supposed to be used on performers who made obvious goofs during a live broadcast. And since most shows were live back then, it is a good thing those Rettysnitchers were strictly mythical.

Remote was a broadcast away from the station. Remember the big bands? *Mike* was short for microphone. *Hit The Air* meant to broadcast by radio. *Mat Stint* was an afternoon program, or assignment. *Miketivity* was the fine art of radio broadcasting. A *Musical Tab* was a short musical program, or interlude. *N.G.* meant a terrible program. That's short for No Good, as you may have guessed.

On the Air meant a station was in operation. *On*, all by itself, was a shorter version of the same expression. What was *Parlor Spray*? That is what they used to call radio programs in general.

How about *Programmer*? That was the director of radio programs at a station. *Radiotics* were anecdotes about radio. *The Gang*



was what they called all "the members of the radio brotherhood". A *Tunesmith* was a composer of tunes. No mystery about that one. But how about *Tunesmithing*? That was singing the song composed by the Tunesmith.

Let's have a quiz. Ten examples of radio slang follow. Let's see how many you can match up.

1. Wobble
2. Adenoidal
3. Beard
4. Bootleg
5. Land The Nod
6. Mike Hugger
7. Squeak Box
8. Crime Club Airing
9. Easy On The Ears
10. Ether Links

- a. An unlicensed station
- b. Unsteady radio signals
- c. Poor radio voice
- d. A mystery or police show
- e. Excited performer who grabs hold of microphone
- f. A mumblor on a radio show
- g. Pleasant listening
- h. A radio network
- i. Another name for the parlor radio
- j. To get a job in broadcasting

Bet you can't get this one. What was *Local Gallii-Curcia*? It was one of those amateur shows that were all over the air during radio's early years.

And finally, how about *Sign-off*? That meant you were almost out of time. The moment had arrived to give your signature farewell, and get off the airwaves. Simply stated, the time had come to shut up.

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Old broadcasting photos courtesy of www.coutant.org/old/index.html



MT Visits with Larry Van Horn, Assistant Editor and columnist

**Larry, how did you first get interested in radio?
What was the spark?**

Actually it started when my parents gave me my first radio, an "All American" five tube AM clock radio for Christmas in 1964. I started tuning around one evening after sunset and found that I could hear distant radio stations in the AM broadcast band. I was not only fascinated, but hooked.

A teenager in my neighborhood, who was also a ham, took me under his wing and I spent many a long night in his shack listening to stations from around the world. Thanks to him I also discovered *Popular Electronics* and *Electronics Illustrated*, and writers such as Tom Kneitel (yes, I remember back that far, Tom) and that set the hook in for good. Christmas 1965 found a new Hallicrafters S-120 shortwave under the tree and the rest as they say, is history.

When did you start writing about radio for a publication?

My first radio writing gig was with the RCMA (Radio Communications Monitoring Association) scanner newsletter around 1980. I had been a longtime member of the group dating back to well before it became a national radio club. There was an editorial opening for a satellite columnist, and since I had been active in that part of the hobby for a number of years I applied for the position and was accepted.

How and when did you get started writing for MT, and how many different columns have you written for the magazine?

Actually, it was a follow-on to my RCMA column. About a year into Bob publishing *MT*, we were chatting on the phone one day, and I asked him if he would be interested in a satellite column like the one I was writing for the RCMA. Boy, was I glad he took that bait and in the September-October 1983 issue of the then bi-monthly *MT*, my first byline appeared. I spent the first few years

writing the *Signals from Space* column, but in 1988, then-editor Larry Miller asked me if I could switch to the utility HF column. Since I also had a broad interest in that segment of the radio hobby, I accepted and renamed it *Utility World* and wrote 120 consecutive monthly (10 years) UW columns for *MT*. I have also tackled the *Fed Files* column (twice), and, of course, now pen the *Milcom*, *MT Help Desk*, and *First Look* columns, among other things.

SIGNALS FROM SPACE



What is your favorite story you have written for MT over these nearly 25 years?

I have written many, many feature articles for *MT*, but my sentimental favorite has to be the feature story I wrote on the *Challenger* shuttle disaster. A close second would be the story *Spies, Lies and Numbers*, where I exposed for the first time the true mission of the spy numbers station at Vint Hill farms in Virginia.

You've had such a broad interest in all kinds of communications – satellite, utilities, scanning, ham radio, etc – what would you pick as your favorite listening target?

Boy, this is real hard to pin down. I consider myself a full spectrum monitor. My family says, if it transmits, I'll DX it. But, my first two loves (after my wife and family, of course) are chasing DX and contesting voice and digital modes in the ham bands, and prowling the HF/VHF/UHF bands for military and government communications.

Many people are feeling overwhelmed by new technology and discouraged about the disappearance of so many familiar modes and broadcasts. What is your advice to people who think the best days of the hobby are over?

What is your advice to people who think the best days of the hobby are over?

I have been blessed these many years to learn how to be a radio hobbyist from some of the best in the business. Bob Grove, Tom Kneitel, Larry Miller, and many more have all had a profound influence. And the one thing they all have taught me over the years, is not to be content with listening from a book or someone else's scanner list, but to go out and work up my own list based on what I have actually received. In other words – keep a logbook. For me and many of the old timers it is the hunt that is the most satisfying part of the radio hobby.



"Professor" Larry at an early MT convention.

Finding that new station, callsign, or frequency before anyone else does, identifying it, and then being able to pass that along to the rest of the hobby gives me a lot of satisfaction.

Unfortunately, too many hobbyists today are content with using information from what's already known. I see way too much of the "I need the frequency or callsign for..." requests on internet newsgroups. There *are* a lot of new and exciting things to hear on the bands – that is what makes radio listening exciting. With a little investment of time and cash, others could be enjoying the thrill of that hunt as much as I do.

While some stations and services have disappeared from HF and other bands, many others have come along to take their place. I totally dismiss anyone who says there isn't much to hear these days. They are probably using someone's old radio list instead of finding out what is currently happening in the radio spectrum by hearing it for themselves. There are a lot of signals to hear and we are blessed to have some great radio gear and computer technology to let us hear it. I think we are just now coming into the golden age of radio monitoring and I can't wait for the next sunspot peak to really dig in there and enjoy it.

You have mostly answered this, but what do you find most exciting about the future of radio?

I have marveled at all the new radio equipment technology we have at our disposal today. And I don't see that trend changing. We as radio hobbyists are doing a pretty good job of staying up with the communications industry as they change their technology, thanks to industry leaders such as Uniden, Icom, WiNRADiO and AOR. With the future promise of Software Defined Radios and the capability these radios bring to the monitoring plate, I would say we will still have a lot to monitor over the next 25 years. I look forward to finding many more yet to be discovered stations and frequencies in the years to come.



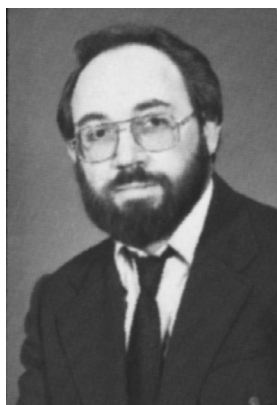
The editor of the short-lived *Satellite Times* in his office.

The Monitoring Times Rogues Gallery

Well, maybe they weren't rogues, but here are a few of the colorful characters who have populated MT's staff pages over the years... We just happened to find these snaps in our files.



Friend, teacher and Elmer to all who asked, they didn't come any better than Doug DeMaw (DeMaw's Workbench).



Pirate Radio columnist Dr. John Santosuosso may have been a swashbucklin' wannabe under that erudite exterior.



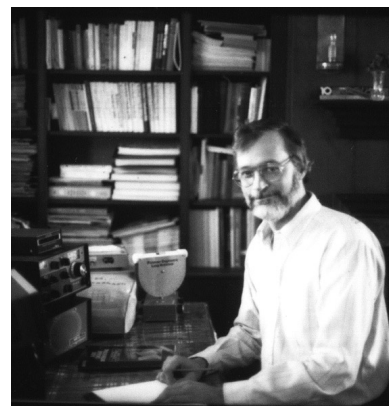
Don Schimmel sparked the imagination of SWLs with Utility Intrigue.



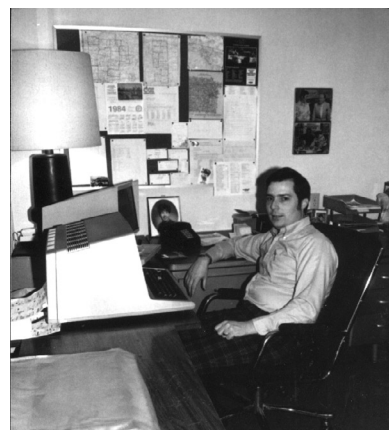
Ike Kerschner headed the On the Ham Bands column for many years - but there's no radio in sight here...



James Hay took DXers On the High Seas.



Larry Magne, editor of Passport to World Band Radio, reviewed SW receivers for this magazine for many years. He hails from Texas, so need we say more?



A familiar name to all, Norm Schrein wrote several scanning columns for MT before he started his own publication.

SANGEAN A Trio of Portability!

Sangean's most recent ATS505P is a dual-conversion portable with continuous coverage from 150 kHz-30 MHz as well as 88-108 MHz FM (stereo with ear buds, included), with AM and USB/LSB reception, and even includes an AC power supply and reel antenna.

45 scannable memories allow automatic sampling of saved frequencies, while auto preset determines which signals are the strongest for reception. Frequencies may be entered directly with the keypad, or continuously adjusted with the tuning dial. Illuminated display shows frequency, 12/24 hour time, adjustable sleep/timer offers gradually-increasing alarm level; entire panel may be locked out to prevent maladjustments.

This multipurpose Sangean AM/FM stereo with cassette short wave receiver is a short wave connoisseur's dream come true. The radio receives AM, FM and continuous coverage of short wave radio reception, and the built-in cassette recorder can be programmed to record specific stations at specific times. The dual-conversion receiver also has a beat-frequency oscillator for single sideband (SSB) and continuous wave. The clock's dual time display shows local and Coordinated Universal Time (UTC). Other features include a preset system that holds up to 54 frequencies in memory, radio/buzzer clock alarm, adjustable sleep timer, signal strength and low-battery indicator. Includes ADPAT-808 6V DC adapter.

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Domestic Shortwave Broadcasting in Russia

By Bernd Trutenau

The last two years have seen considerable changes in the output of regional broadcasting in Russia. Much of this is a result of a fundamental reorganization of the regional state broadcasting sector. While the regional state broadcasting companies initially were affiliates Russia's national state broadcasting company VGTRK, most of them became full daughter companies of VGTRK in 2005. In effect, the funds for regional programming are now mainly administered by VGTRK; in addition, VGTRK is trying to better coordinate the regional output with its national radio networks.

On the financial side, the new structure led to a considerable reduction of the regional stations' budgets, resulting in a dramatic cut down of transmission time and dismissal of staff. As before, the regional broadcasters typically timeshare transmitters with one of VGTRK's national network, particularly Radio Rossii. In the past, many transmitters separated from the national network to carry regional programming during prime time hours, making it difficult or impossible for the listeners in the regions to listen to main program blocks from Moscow. VGTRK has been trying hard to bring the regional schedules on line with the national grid and to reduce such collisions.

On the technical side, Russia's national transmitter network operator RTRN (Russian Television and Radio Broadcasting Network) continues to press forward on a modernization of its transmitter network, even though the enterprise has been complaining lately about dramatic under-funding from government sources. The aim is a full digitalization within the next decade, starting with the TV sector. The digital terrestrial TV network (using the European DVB-T standard) is going to include also the distribution of national radio networks. The gradual switch-off of analogue transmitters is continuing; several high powered longwave transmitters in Siberia and the Far East, which were used by regional stations, have been shut down in recent months.

The trend to abandon AM transmitters in favor of FM frequencies is continuing in Russia, and on shortwave the regional output remains unstable in many regions. Lack of funding or change of priority can cause a cancellation of regional programming blocks at any time, replacing them with only national programming. Examples of



this kind have been observed on the SW transmitters e.g. in Monchegorsk, Arkhangelsk. In other regions, regional programming reappeared after having been absent for a time, like GTRK "Magadan" via the Arman frequencies.

Also affecting regional broadcasting are comprehensive changes in the administrative division of the country. Several large regions have merged to a single unit; others are due to follow in the future. Even though the regional studios of the old regions continue to operate for

the time being, it is only a matter of time until regional broadcasters will be united and studios will be downgraded.

Shortwave Still Important

As before, there are areas in Russia that also now can be reached effectively only by shortwave, like the huge and scarcely populated territories in Central and Northern Siberia and the Russian Far East. Also, the Russian merchant and fishery fleet remains a key target on SW,

Operational SW schedule for the B06 season (winter 2006-2007)

No	kHz	kW	Schedule	Site	Programme
A3	3955	50	2200-1800	Selenginsk, S	R. Rossii + Reg Buryatskaya GTRK
B2	5910	100	0000-0100	Yelizovo, FE	Kamchatka rybatskaya
A9	*5920	100	1700-1300	Yelizovo, FE	R. Rossii + GTRK "Kamchatka"
A8	5930	50	0200-2200	Monchegorsk, E	R. Rossii + GTRK "Murman"
A7	*5935	100	1800-1400	Arman, FE	R. Rossii + GTRK "Magadan"
A7	**5940	100	1700-1300	Arman, FE	R. Rossii + GTRK "Magadan"
B3	5960	100	0930-1000	Vestochka, FE	Radiostantsiya Tikhii okean
B4/5	6005	100	1800-1900	Tbilisskaya, E	R. Maykop/R. Nalchik
A2	*6030	5	0100-1600	Perm, E	R. Rossii + Reg GTRK "T-7"
A5	6060	5	1900-1500	Yakutsk, FE	R. Rossii + Reg NVK "Sakha"
A9	**6075	100	1800-1400	Yelizovo, FE	R. Rossii + GTRK "Kamchatka"
A4	6085	50	2200-1800	Krasnoyarsk, S	R. Rossii + Reg GTRK "Tsentr Rossii"
A6	6100	1	2200-1800	Kyzyl, S	R. Mayak + Reg GTRK "Tyva"
A5	**6150		2000-1600	Yakutsk, FE	R. Rossii + Reg NVK "Sakha"
A2	*6150	5	2300-1400	Perm, E	R. Rossii + Reg GTRK "T-7"
A1	6160	40	0200-2200	Arkhangelsk, E	R. Rossii + Reg GTRK "Pomorje"
RR	6235	250	1820-2200	Moscow, E	R. Rossii
A5	7140		2000-1600	Yakutsk, FE	R. Rossii + Reg NVK "Sakha"
A5	7200		2000-1600	Yakutsk, FE	R. Rossii + Reg NVK "Sakha"
RR	7310	250	1320-1800	Moscow, E	R. Rossii
A7	7320	100	1900-1500	Arman, FE	R. Rossii + GTRK "Magadan"
B3	7330	100	0930-1000	Vestochka, FE	Radiostantsiya Tikhii okean
A5	7345		2000-1600	Yakutsk, FE	R. Rossii + Reg NVK "Sakha"
RR	9840	250	0500-0800	Moscow, E	R. Rossii
B1	9860	200	0710-0800	Samara, E	Na volne Tatarstana
A2	11650	5	1600-2000	Perm, E	R. Rossii + Reg GTRK "T-7"
B1	11915	200	0910-1000	Samara, E	Na volne Tatarstana
B2	11975	200	0000-0100	Yelizovo, FE	Kamchatka rybatskaya
RR	12075	250	0820-1300	Moscow, E	R. Rossii



not the least after the switch-off of several LW transmitters that used to cover the territorial waters. New forms of financial backing, like additional funding from regional authorities, have guaranteed the continuation of popular programs for sailors like "Kamchatka rybatskaya."

On the private sector, a new station has been on the airwaves since a year: Spetsialnoye Radio ("Special Radio"). It's a music station based in Moscow which initially was renting a transmitter in Russia, but then turned to a lease in Uzbekistan for a better coverage of its main target area (Central/Western Russia and Europe). At deadline it was unclear if the station will continue to broadcast on SW during the winter season B06.

E) European part of Russia; S) Siberia; FE) Russian Far East

*) Summer months only (tentative freq's season A07); **) Winter months only (B06)

RR) Radio Rossii relay (without regional programming)

GTRK = gosudarstvennaya teleradiokompaniya ("state broadcasting company"); NVK = natsionalnaya veshchatelnaya kompaniya ("national broadcasting company")

A) Ordinary regional services (state-run)

A1) GTRK "Pomorje"

Address: ul. Popova 2, 163061 Arkhangelsk.
Email: pomorie@atnet.ru
Regional prgr's: unconfirmed.

A2) Permskaya GTRK "T-7"

Address: ul. Tekhnicheskaya 7, 614070 Perm.
Email: main@t7.ru
Regional prgr's: Mon-Fri 0210-0300, 0310-0400, 1310-1400; Wed 1610-1700; Sat 0210-0300, 0810-0900; Sun 0410-0500.

A3) Buryatskaya GTRK

Address: ul. Erbanova 7, 670000 Ulan-Ude.

Email: office@bgtrk.ru

Regional prgr's: 2200-0500, 1100-1200.

Notes: Prgr's in Buryat and Russian.

A4) GTRK "Tsentri Rossii"

Address: ul. Mechnikova 44a, 660028 Krasnoyarsk.

Email: new@public.krasnet.ru

Regional prgr's: Mon-Fri 2310-0100, 1110-1300; Sat/Sun 0000-0400.

A5) NVK "Sakha"

Address: ul. Ordzhonikidze 48, 677007 Yakutsk.

Email: radiotv@nbcasakha.ru

Regional prgr's: 0310-0500 (Tue-Thu), 0410-0500 (Fri), 0910-1300 (Mon-Fri), 2120-2400 (Sun-Thu), 2210-0455 (Fri/Sat).

Notes: prgr's in Russian and Yakutian. Each frequency has a different beam, some freq's may not be in operation.

A6) GTRK "Tyva"

Address: ul. Gornaya 31, 667003 Kyzyl.

Email: tv@tuva.ru

Regional prgr's: 2310-2400, 0010-0100, 1110-1200, 1210-1300.

Notes: prgr's in Russian and Tuvian. Observed relaying both Radio Mayak and Radio Rossii.

A7) GTRK "Magadan"

Address: GTRK "Magadan", ul. Kommuny 8/12, 685024 Magadan.

Email: center@magtrk.ru

Regional prgr's: Mon-Fri 0200-0210, 0700-0710, 2010-2100, 2300-2310 (Fri 2400); Sat 0200-0210, 0700-0710; Sun 2010-2100, 2300-2310.

A8) GTRK "Murmansk"

Address: per. Rusanova 7, 183032 Murmansk.

Email: radio@tvmurmansk.com

Regional prgr's: unconfirmed.

A9) GTRK "Kamchatka"

Address: ul. Sovetskaya 62, 683000 Petropavlovsk-Kamchatskiy.

Email: gtrkotk@mail.iks.ru

Regional prgr's: Sun-Thu 1810-1900, 1910-2000; Fri/Sat 2210-2300; Mon-Fri 0100-0200, 0600-0700; Sat/Sun 0010-0100.

B) Special regionally produced programming (state-run)

B1) Na volne Tatarstana ("On the air waves of Tatarstan")

Produced by: GTRK "Tatarstan" (formerly produced by TRK "Novyy vek")

Address: ul. Sh. Usmanova 9, 420095 Kazan.

Email: secret@trttv.ru

Reception reports: QSL cards are available for 2 IRCs, \$1 or 1 Euro from QSL-manager Ildus Ibatullin (P.O. Box 134, 420136 Kazan, Russia).

Schedule: 0510-0600 towards Russian Far East on 15105, 0710-0800 towards Urals and W. Siberia on 9860, 0910-1000 towards We. Russia on 11915kHz.

Notes: A service in Tatar and Russian for the over 2.5 million ethnic Tatars living outside of Tatarstan in other parts of the Russian Federation.

B2) Kamchatka rybatskaya ("Kamchatka for fishermen")

Produced by: GTRK "Kamchatka"

Address: ul. Sovetskaya 62, 683000 Petropavlovsk-Kamchatskiy.

Email: gtrkotk@mail.iks.ru

Schedule: 0000-0100 in Russian on 5910/11975kHz.

Notes: A service for Russian fishermen in the Pacific Ocean.

B3) Radiostantsiya Tikhii okean ("Radio Station Pacific Ocean")

Produced by: TGTRK "Vladivostok"

Address: ul. Uborevicha 20-a, 690670 Vladivostok.

Email: ptr@ptr-vlad.ru

Schedule: 0930-1000 in Russian on 5960/733kHz.

Notes: A service for sailors and fishermen in the Sea of Okhotsk and Japanese Sea.

B4) Radio Maykop

Produced by: GTRK "Adygeya"

Address: ul. Zhukovskogo 24, 352700 Maykop.

Email: trkra@maykop.ru

Schedule: Mon/Fri 1800-1830 in Adyghian on 6005kHz.

Notes: A service for Adygean expatriates living in the Near East. May include sequences in languages of the target area, like Arabic and Turkish.

B5) Radio Nalchik

Produced by: GTRK "Kabbalkteleradio"

Address: pr. Lenina 3, 360000 Nalchik.

Email: tvkbr@mail.ru

Schedule: Wed/Thu/Sun 1830-1900 in Kabardino-Circassian and Balkar on 6005kHz.

Notes: A service for Circassian expatriates living in the Near East. May include sequences in languages of the target area, like Arabic and Turkish.

C) Other broadcasters

C1) Spetsialnoye Radio

Address: ul. Efremova 10, office 417, 113092 Moscow.

Email: admin@specialradio.ru

NB. All regional schedules are subject to change without notice.



Radio Frequency Identification: Technological Advance or Privacy Invasion?

By Ken Reitz

The modern concept of Radio Frequency Identification (RFID) has been used for decades in the skies. Airplanes are equipped with *transponders* which identify the plane to all other planes and airports able to read the transponder. Similarly, RFID transmitters are used by scientists, hunters and anyone else needing to keep track of anything from field study subjects to hunting dogs. Nothing basically new.

But, in the last few years, with advancements in microelectronic technology and insanely active front men, a whole new RFID industry has blossomed to life. It's become the great buzz of the retail economy, a boon to law enforcement, a relief to the families of Alzheimer's patients, and a cool item in trendy hot-spots.

In the coming years, tens of millions of RFID devices, called *tags*, will proliferate in hundreds of thousands of retail stores, public and private institutions, all branches of the military and anywhere a tag can be stuck throughout the country. What, if any, are the threats to users of the RF spectrum and what are the general privacy issues?

RFID Technology

There are dozens of different RFID tags, but basically they all fall into two types: active and

passive. All are capable of transmitting whatever they're programmed to send. Some can be re-programmed. Active tags have built-in power supplies which power their tiny transmitters while passive tags use the power transmitted from the tag reader to transmit back the programmed data on their miniature antennas.

Tags, complete with data and antenna, can actually be printed on small labels which are placed on or in various objects. These tags typically cost a few cents each to make. More complex active tags can cost several dollars. Normally, RFID tags are attached to mundane items such as clothing apparel, tires or normal household items, but improvements in micro circuitry have made RFID transmitters so small that they can be easily inserted into a person, just below the surface of the skin.

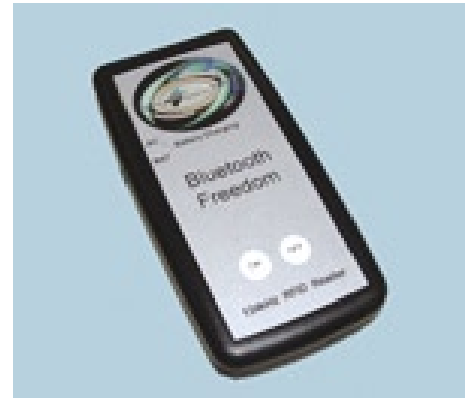
In some applications RFID readers are hooked up to a host computer and the output of the reader is fed to a dipole antenna which may be above, say, a conveyor belt in an airport. Each piece of luggage is tagged and responds to the pulses from the antenna and the data sent back from each bag may help route the bag to the correct airplane.

In other applications, a hand-held reader scans the contents of a pallet or rack of products and the data is stored in the hand-held unit for later dumping to the host computer. According to industry trade journals and other sources, RFID tags can be read from a distance anywhere from a few feet to several miles, depending on the type of tag and the sophistication of the reader.

For years tags have been embedded in cards used for transportation systems, hotel door keys, and to access programming from small dish satellite TV systems. Tags are currently used in some automobiles to allow owners to open locked doors and start the car without the key leaving the owner's pocket or purse. Tags are found in department stores as inventory trackers, in libraries to aid circulation, in hospitals to track medicines as well as patients, in prisons to track the prisoners, and a number of other places which grows exponentially each year.

According to RF-ID.com, a company specializing in RFID solutions, typical tag memory depends on what frequency the tag is designed and for what application it is to be used. Tags can be programmed and re-programmed up to 100,000 times. They claim that as many as 50 low

This little chip could rule the world! VeriChip's implantable RFID. (Courtesy: VeriChip Corp.)



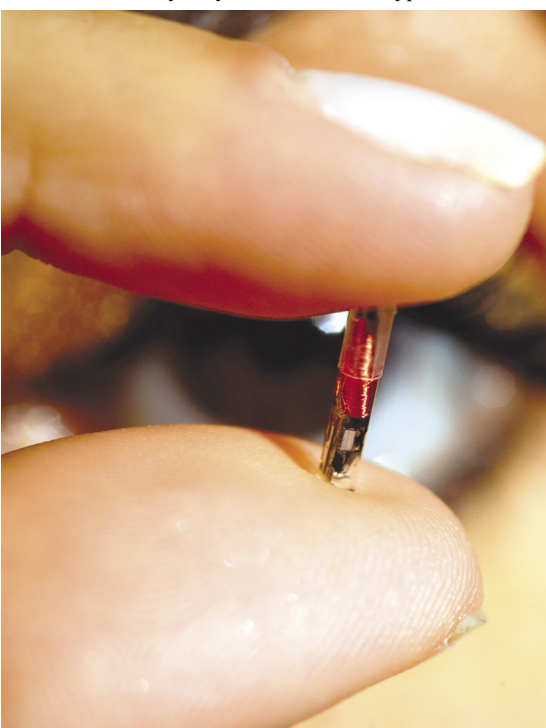
TEK Industries Freedom HF Bluetooth hand-held RFID reader/writer works industry standard 13.56 MHz RFID tags. (Courtesy TEK Industries)

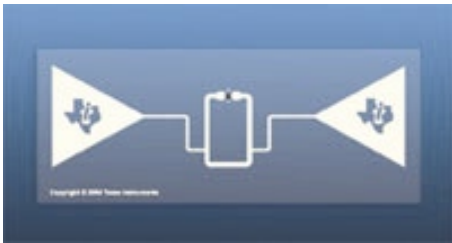
frequency tags per second can be read, regardless of how many are in the tag zone. That number increases to 200 tags per second at 869 MHz. Data durability is said to be good at 22 °C for up to 10 years.

More RF Hash

From garage door openers to wireless fences, car keys to Wi-Fi, it seems like every six months there is a new wave of RF radiation pulsing around us. And, with the FCC auctioning off the public's HF spectrum, leaving the landscape open to wild-west style tech shoot-outs among unlicensed commercial operators, there's reason to believe that interference will occur around those slices of the spectrum where RFID is found. There are plenty of potential sites at risk: public service repeaters, cell phone towers, radar installations and newer planned services not yet deployed.

A little over a year ago the *RFID Journal* reported that the Department of Defense was to investigate their own RFID systems (in use for over 10 years) which might cause interference with radar equipment. According to the report, the DoD RFID system, operating in the 433 MHz band, is used in shipping materiel worldwide, including into Iraq. The potential conflict is that the DoD's global ground-based, shipboard and airborne radar uses 420-450 MHz. Results of the tests were not reported, but the *RFID Journal* did report that the FCC forbids RFID readers being deployed within 25 miles of five key U.S. radar installations.





Texas Instruments' Generation 2 Inlay tag. For inclusion in a "smart label" this tag features an innovative antenna design and 96 bits of user programmable memory. (Courtesy: Texas Instruments)

More recently, as reported in Australian IT, computer giant IBM had to pull the plug on an RFID demo it was showing off at this past year's Australian Tennis Open. Regarding the offending piece of equipment, the report quoted an IBM spokesperson as saying, "...The piece of non-IBM equipment was a third party RFID scanner, used as part of a showcase demonstrating RFID capabilities to clients." Apparently the scanner was causing interference to nearby Vodafone towers using the same frequencies.

Such reports point up the early nature of deployment of this technology and the need for coordination when determining how an RFID service should operate. There are many ways to shield intended operations, and operators need to select proper operating frequencies when designing their system. In addition, manufacturers of scanners and readers have to tighten quality control to avoid RF interference. As seen in the instance of FM modulators for cars, manufacturers have to be held accountable to ensure their products don't exceed legal limits.

RFID Pro's and Con's

Much of the RFID reporting found in industry trade journals touts the obvious reasons to employ RFID in retail, law enforcement or medical environments. But, their worth becomes cloudy when used for everything from state driver's licenses to credit cards. There seem to be more questions than answers. And, most of those questions surround the privacy of the individual, though there should also be fears for corporate, legal, and defense security interests as well.

Among the issues is the increase in the growing amount of data amassed about each person in this country. It's not enough that junk mail companies, spammers, junk FAXers, and junk callers have access to our names, addresses, telephone numbers and e-mail accounts. Thanks to years of using "store loyalty" cards, they also know

what kind of toothpaste and deodorant we use. And now, with RFIDs they'll not only be able to see what we bought, but where we've taken

Texas Instruments' Series Series 2000 gate antenna intended for outdoor parking lot access control. (Courtesy: Texas Instruments)



it and what we've done with it. Imagine a "white van" parked outside your house with an array of RFID antennas mining the contents of your home for all manner of data.



Windshield mounted 915 MHz RFID tag from Intermec for toll and parking access. (Courtesy: Intermec)

It's easy to start feeling paranoid about the potential for misuse of RFID. Your paranoia many not be misplaced. Two people have made a cottage industry out of exposing the problems of RFID technology and have been as rigorous in their complaints as the industry has been in promoting its virtues. Katherine Albrecht and Liz McIntyre maintain a web site called www.spychips.com. Here they beat a steady drum against the onslaught of the entire RFID industry. Since 2002, they've exposed many of the false claims asserted by RFID manufacturers and have held the entire industry to account in matters of privacy and security.

Imagine a criminal sitting in an airport lounge with a laptop and a reader checking out prospective victims as they parade past. It's not that far-fetched. SpyChips.com provides a link to an article in *The New York Times* from October 23, 2006, showing that new credit cards being issued by VISA, Mastercard, and American Express, all of which contain RFID chips, had security flaws that allowed the cards to be read with equipment easily put together from off-the-shelf computer and radio parts for about \$150.

March of Progress

As the march of RFID progresses, there's a continuing tug-of-war between excited company PR departments and wary consumers. According to SpyChips.com, the Department of Homeland Security is seeking new RFID readers capable of reading tags from 25 feet away. Adding fuel to the fire, there's a story from last March about a study reported in *Network World* which revealed that RFID tags are subject to viruses. According to the report, "...It only took a Master's student at the [Dutch] university....four hours to write a virus



ID card RFID tag from Intermec provides long range identification and multiple read/write capability. (Courtesy: Intermec)

small enough to fit on an RFID tag...something thought previously unworkable..."

There was great suspicion in the 1970s among consumers when UPC barcodes were first introduced. But those innocent, passive codes were nothing compared to their broadcast-capable offspring! To prevent the worst fears of many, governments and corporations will have to demonstrate that they've taken serious steps to protect what little privacy remains to the individual.

SOURCES

You can stay up-to-date on this new industry buy checking in at the following sources:

Network World:

On-line trade journal relating to the RFID industry: www.networkworld.com

RFID Journal International:

On-line trade journal concerning RFID developments: www.rfidjournal.com

RFID Gazette:

Another on-line trade journal about RFID industry: www.rfidgazette.com

RFID Web-Log:

Tries to keep track of happenings in the industry; also has extensive links to industry related companies: www.rfidweb-log.com

SpyChips.com:

An anti-RFID web site devoted to exposing the problems with the technology as well as privacy issues. They track the trackers: www.spychips.com

PAR ELECTRONICS EF-SWL



The **Par EF-SWL** is an end-fed short wave antenna optimally designed for 1-30 MHz reception. The radiator is 45 feet of genuine #14 gauge black polyethylene coated Flex-Weave wire (168 strands of #36 gauge woven copper). This material is very strong yet can easily be coiled like a rope for portable work. The UV resistant matchbox houses a wideband 9:1 transformer wound on a binocular core. Unlike other transformers, external stainless studs on the matchbox allow the user to configure the primary and secondary grounds for best noise reduction at their particular location. Output is via a silver/teflon SO239 connector.

Par EF-SWL Order #2205 \$57.95

Universal also carries the **Par MON3** omni VHF-UHF base antenna and **Par RF filters**.

Note: Orders under \$100 ship UPS for only \$6.95.

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Reynoldsburg, OH 43068
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♦ Info: 614 866-4267
♦ Fax: 614 866-2339

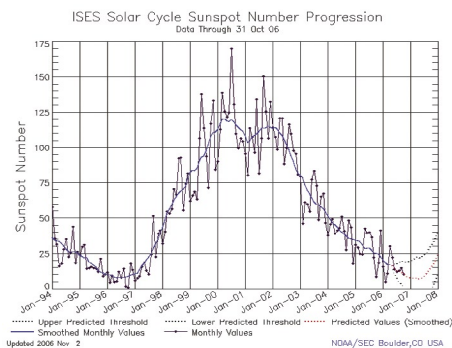
Preparing for the "Good Ol' Days" Plus: More Parts Sources

Anyone who was a shortwave listener or a ham at the peak of the last solar cycle gets misty-eyed when they think about how great it was. Those who were not around to enjoy it hear the stories and find it all too hard to believe. With current dismal conditions across all the bands, you're right to take these stories with a handful of salt. But, the fact is that you can believe every one of them. That's how good it was!

Listen: 20 meters was a 'round-the-clock band. You could tune in any hour of the day and the band was packed. 15 meters was open to DX every day until way after dark (and in the summer that meant close to midnight!). 10 meters was a QRP (low power) operator's dream. With 5 watts (CW) and 10 watts (SSB) you could work the whole wide world with Q5 (readability 5 out of 5) signals. WAS (Worked All States) could be accomplished over a weekend. Five Band WAS might take a whole month! DXCC (100 countries confirmed) the work of a couple of unhurried weekends.

❖ How to Tell a Good Time

Predicting the solar cycle is a lot like predicting Earth weather. You look a lot smarter if you can do it in retrospect. Since March 1755 (solar cycle #1), scientists have been poring over the data trying to come up with a proven predictor model. They may not have one yet, but here's what they think they know. According to *Space Today On-line*, Cycle 23 reached its peak in April 2000 and the bottom will occur sometime this year. They believe the peak of cycle 24 will be sometime in 2011



Solar Cycle chart from NOAA and the Space Environment Center shows the sunspot number progression through cycle 23. (Courtesy: NOAA/SEC)

just four years from now.

In general, the rise to the peak is faster than the decline to the bottom. Conditions will rapidly get better over the next 18 months as we approach that point. Of course, as with Earth-based weather there are storms within storms, anomalies during times of normal conditions, and lows where there ought not to be. There will be excellent conditions cropping up for no apparent reason at the most unexpected times. But, there will surely come a time when conditions will be so good all the time that you'll start to take them for granted. When that happens you had better be prepared.

❖ How to Succeed

If you're not a ham already, you need to look into getting your ticket. Now, you've heard it all before, but let me reiterate: It's never been easier to get your Technician Class license than it is today. Further, it's possible that by the time you are ready for your exam that the miniscule Morse Code (CW) requirement (5 wpm) will have been done away with and you could take your General Class exam and be ready to hit the HF bands just in time for the rise to Cycle 24 glory!

So, why not just start out studying for the General Class exam? Even if CW is not done away with, you'll still have your Technician ticket *and* you'll get credit for the General written exam. Then you can either sit it out until CW is done away with (after which you'll be "grandfathered" in) or – gulp! – you can learn CW. Either way you win!

But, just how do you get started? There's a different way for each person. The best way is to learn with another person – a friend who shares your interest or a family member (son, daughter or spouse) who wants to be included in your hobby. I ordered the study guides from ARRL headquarters including the CW tapes (yes, it was years ago, before CD ROM-based computer programs for CW had been invented). My daughter (who was 12 at the time) and I set aside a time each day to study and practice code. It was a gruel-

ing process, but we did it.

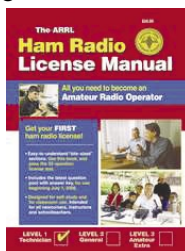
A better way is to go to classes conducted by your local amateur radio club. This way real, live experts guide you through the material and your success is pretty much guaranteed. Everybody *wants* you to succeed!

To find a club near you which offers classes and welcomes newcomers, go to **www.arrl.org** and click on "clubs" in the left hand side of the top banner. This allows you to generate a list of clubs by state or zip code which are within 20, 50 or 100 miles of your location. The list gives you specific information about the clubs, complete with a contact person, their phone number and sometimes an e-mail address. A club web site, if available, is also listed. Look for clubs which specifically welcome newcomers and offer entry level classes. These will be the most friendly clubs to join.

To find out what the class schedule is for clubs in your area, go back to the top banner and click the left side where it says "classes." This allows you to generate a list of clubs offering classes within 20 or 50 miles of your home. The beginning and ending dates for the courses are listed, along with the times they are offered, number of sessions, class level (Technician, General, Extra), if CW is taught, if pre-registration is required, what fee (if any), class type, instructor, and if exams are offered. This is extremely helpful. It takes all the hassle out of getting your license. All you have to do is try.

❖ DIY Ham Ticket

If you opt to study on your own, you'll need to know where to go to take the appropriate level exam. To find out, go back to the banner and this time click on "exam." Again, you'll generate a list of places to take the exam within 20, 50 or 100 miles of where you live. This list notes the date of the exam, the location, a contact person with a phone number and e-mail address. Most importantly, it notes whether pre-registration is expected or if "walk-ins" are allowed. Walk-ins mean that you can just show up unannounced and take the exam. Either way, you must bring the necessary documents and fees to take the test. The ARRL authorizes the fee of \$14 per applicant per session. Retest of a failed element at the same session will require an additional test fee. Contact the person listed about the



ARRL's Technician Class License manual. Easy way to get started. (Courtesy: ARRL)

requirements where you'll take your exam.

If you're going to try the do-it-yourself (DIY) approach to getting your ticket, there are a number of study aides to consider. All of them work. You can choose ARRL license manuals (www.arrl.org/catalog/lm) or the W5YI study guides found at www.w5yi.org (just click on "study materials" in the left hand column). The W5YI organization offers its own Volunteer Exam Coordinator (VEC) sessions which are listed on the site. Contact the person listed for information on exam dates and exact locations. Both ARRL and W5YI exams result in FCC issued amateur radio licenses. The choice is yours.

There are many web sites which offer on-line practice exams. This is a great way to pre-test yourself before the actual exam. It allows you to see where you need a little more study and it prepares you for the type of exam you'll likely see. Try any of the sites listed here: www.aa9pw.com/radio, www.eham.net/exams, www.qrz.com/testing.html. Even if you've never looked at a study guide, take one of these Technician practice exams. You might be surprised at how much you already know. That ham ticket may not be as hard as you thought.

As for CW practice, there are a number of options: CD-ROM based CW programs are great; even old-fashioned tapes work though they can't be programmed to do random sending. Once you have the basics under your belt, nothing beats copying W1AW (the ARRL HQ amateur radio station in Newington, CT) which offers Morse code practice at the frequencies and times listed below. Find the frequency which comes in the best at the time you'd like to copy. The list below is for "slow code" which starts out at 5 wpm and increases to 7-1/2, 10, 13 and 15 wpm. Copy till you can't! The great thing about copying W1AW is that the code is sent perfectly and it's in the real HF environment. Expect fading, adjacent frequency interference, near-by tuner-uppers, Lids (poor operators) sending right on top of W1AW, and more.

It's January, the beginning of a new year. Make your resolution to get your ham ticket and get ready to make your own "Good Ol' Days!"

❖ More Parts Sources

Last October I wrote in this column about sources for parts. Two readers had other sources which I missed and were worth noting. Dan, WA4PXV, wrote to tell me about Mendelson's Liquidation Outlet, MECI (www.meci.com). There's the usual electronic components and I found 650 feet of RG/6 coax (perfect for satellite TV, FM and off-air TV installations) for \$38.95 (that's about 6 cents/foot) plus shipping. There's also the odd surplus items such as the B-47 Stratojet Radar and Antenna (just \$495 while supplies last!).

Judy May, W1ORO, wrote to add Digi-Key (www.digikey.com), a major electronics parts supplier based in Thief River Fall, MN. Products in their on-line catalog are easily searched and cover the usual group of electronic components. Call for their catalog at 800-344-4539.

Judy also talked about her "PIC chip breadboard and its programmer." A computer programmer by trade, she uses the PIC 16F876 chip and the manufacturer's ICD (In Circuit Debugger) which she

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Parts Search → GO
Quality Electronic Components, Superior Service

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HF Communication Today Worldwide Broadcast and Utility Radio Stations

WAVECOM W61PC - 24102006 TELDE AERO CANARY ISLANDS 13303 kHz www.klingenfuss.org	HF Modes	VHF/UHF Modes	Demodulator	Options	Events	Status	View	Window	Help
24 Oct 2006, 15:25:46 UTC	Max Bit rate 1200 bps, Oldest Seq. No. 0, LPDU Vector [U(R) + 1.8] = 00000000								
24 Oct 2006, 15:25:46 UTC	[LINK DATA - LOG ON RESUME] ICAO FB5D45								
24 Oct 2006, 15:25:46 UTC	[NETWORK DATA - FREQUENCY DATA]: 15:25:30 UTC Sync								
24 Oct 2006, 15:25:46 UTC	Flight ID = UPO203, Latitude 46:16 NORTH, Longitude 64:138 WEST								
24 Oct 2006, 15:25:46 UTC	Ground Station 17: TELDE - CANARY ISLANDS								
24 Oct 2006, 15:25:46 UTC	Propagating frequencies: 21955 kHz 13303 kHz								
24 Oct 2006, 15:25:46 UTC	Tuned frequencies: 21955 kHz 17928 kHz 13303 kHz 8948 kHz 652								
24 Oct 2006, 15:25:46 UTC	9 kHz 2905 kHz								
24 Oct 2006, 15:25:46 UTC	Ground Station 02: MOLOKAI - HAWAII								
24 Oct 2006, 15:25:46 UTC	Propagating frequencies: Freq (M/A)								
24 Oct 2006, 15:25:46 UTC	Tuned frequencies: 21937 kHz 21928 kHz 17934 kHz 17919 kHz 1327								
24 Oct 2006, 15:25:46 UTC	6 kHz 11348 kHz 11312 kHz 10081 kHz 8936 kHz 8912 kHz 6559								

2007 Super Frequency List CD - EUR 30 = \$ 37

9,100 shortwave broadcast frequencies, 9,500 frequencies of utility radio stations, plus 20,700 formerly active frequencies. 260 fascinating digital data decoder screenshots. 13th edition!

2007 Shortwave Frequency Guide - EUR 40 = \$ 50

460 pages, 19,000 entries with all broadcast and utility stations worldwide. Latest schedules for 2007. Clearly arranged and really user-friendly. 11th edition!

2007/2008 Guide to Utility Radio Stations - EUR 50 = \$ 62

600 pages, 9,500 frequencies and hundreds of screenshots. Frequencies, stations, call signs, codes, abbreviations, meteo/NAVTEX/press schedules, and much more. 24th edition!

Radio Data Code Manual - EUR 50 = \$ 62

600 pages. Digital data transmission on HF. Military modem standards, Meteo and aero codes, Unicoode. Hundreds of screenshots. Used by radio monitoring services worldwide. 17th edition!

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bought six years ago for \$99. She taught herself to program the chip and has "...four devices under my belt and still in service. One is a really smart charger for lead acid batteries (that includes those that power the ham radios). Another is an aerial helium balloon digital camera. For someone who likes to invent and build things, microcontrollers can be a fun full-time hobby."

Thanks, Judy! If you have an electronics related project you've been learning about, let the rest of us beginners know. We all like to learn!

W1AW CW Practice Frequencies and Times for Slow Code Practice

Frequencies (MHz):

1.8175, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675

Day/Times (ET):

Wed. & Fri. 9:00 am

Tues. & Thurs. 4:00 pm

Mon., Wed., & Fri. 7:00 pm

Tues. & Thurs. 10:00 pm

FREE SPEECH RADIO WBCQ Shortwave

7.415 - 9.330 - 5.110 - 18.910

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Q. *I live in southeast Michigan in open country with no antenna restrictions. I'm running a Grove Sky Wire about 20 feet off the ground in a straight, N-S direction, fed through about 100 feet of RG-58/U and a Grove TUN 4 inside my basement. Sometimes reception is not at its best. Should I re-orient my antenna, install two Skywires at right angles, or run a newer antenna like the PAR 'End Fedz'? (Glenn Bowman, KC8WUL)*

A. Currently, shortwave reception is erratic since we are just passing the low ebb of the sunspot cycle. If all of your receivers experience the same poor reception, it has to be either signal propagation or your antenna system.

First I'd recommend you carefully inspect the entire antenna system – solder joints, coax connectors and adaptors, the coax itself (squirrels and my collies eat mine!). You might try measuring the resistance to the antenna this way: Disconnect the connector from your receiver and put an ohmmeter (high ohms) across the shell and center pin; you should see no reading (maybe very high resistance – many thousands of ohms – which would be OK, but could indicate moisture intrusion).

Next, clip a wired pair of alligators across the antenna center connector and make the same measurement as before at the receiver connector, but this time on low ohms. You should see the dead short – no more than a few ohms.

The PAR antenna is excellent, and the Skywire is also a fine antenna. Whichever you choose, you could put it up at right angles to the first antenna (they can even cross without mutual interference). You could select between them with an antenna switch for best reception, or simply unscrew one antenna cable and attach the other.

Even easier, you could erect a vertical antenna hung from a tree limb like the very popular, low cost, Grove FlexTenna model HVU; that's what I use, and it receives uniformly well from any direction!

Q. *I have erected a shortwave dipole and know that it favors reception off its two sides, not its ends. Can I erect another dipole at right angles to it for all-round*

reception? (Russ Lashbrook, email)

A. You sure can, but don't connect them both together; run separate coax lines to each and choose between them with an antenna switch. The reason for this is that at some frequencies, depending upon the angle of arrival, a signal can cancel itself out by hitting the two antennas out of phase.

Q. *Why do I need to use a multicoupler when I can just use a T connector to feed both scanners? (Jim Miossi, email)*

A. The tee would work fine to split the signal, but the multicoupler better isolates the two scanners from each other, reducing the oscillator radiation of one from being received by the other, locking up scanning sequences and introducing the "click-click" interference.

Q. *I have an old TV/FM antenna preamplifier with a switchable FM trap. Is that a good choice for scanner reception?*

A. It depends on several things: Does it add more noise than signal? Does the additional gain cause overload symptoms on the scanner like spurious intermod signals? Does the pre-amp have built-in filters that actually reduce signals in the land mobile and aircraft band spectrum?

Only by testing the unit in and out of the antenna line on various frequency ranges can you determine that without appropriate test equipment like a spectrum analyzer.

Q. *I noticed vegetation growing up some rural power poles; the vines appeared to be touching the wires. Are they insulated, or could this cause flash-over? (Mark Burns, Terre Haute, IN)*

A. Vegetation coming near a bare power distribution line can, indeed, cause flash-over which can result in a fire. Factors include how high the voltage is on the lines, and whether conditions are wet or dry. There are insulated high-tension lines which allow the wires to go right through the tree canopy, but it's more expensive, and falling limbs can still cause a problem.

If vegetation does crawl into the wires, it is usually cooked before it causes a serious short circuit or produces flash-over, but should that occur, power is automatically interrupted and restarted several times by a circuit breaker on that line. More serious shorts throw the main breaker at the sub-station. In any case, you should certainly contact the power company to follow up your observation.

Q. *Are there any electrical medical devices that provide pain relief based on the Tesla coil? Surely there must have been some positive results as the man was truly a genius and ahead of his times. (Tony Scioli, email)*

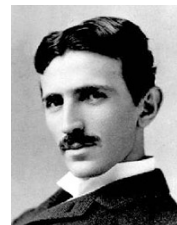
A. There's no question that Nicola Tesla was a genius, way ahead of his time in terms of practical applications for his alternating-current (AC), high-voltage transformers, but they didn't have any validity in treating pain.

Typical applications of Tesla's high voltage were those "violet ray" devices which had a hand-held wand encapsulating the step-up transformer.

A battery's direct current was changed to pulsating DC via an "interrupter," a vibrating contact in the same wand. The name "violet ray" referred to the blue glow emitted from the partially-evacuated glass electrodes inserted into the end of the wand, the high voltage ionizing (electrically charging) the remaining air, mostly nitrogen which glows blue under those conditions.

An earlier device, the Faradic battery, had a lower voltage output and was applied directly to the body rather than indirectly through an ionized-gas, glass electrode. Both schemes had intensity (voltage) controls adjustable to different discomfort levels. You can find many of these devices on eBay by searching for "quack medical," "violet ray" and the like.

Currently, the more modern transcutaneous electrical nerve stimulation (TENS) units are in vogue; they also produce an electrical current which purports to block pain. (See www.quackmedicine.com for more from Bob on this subject - ed.)



Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. Mail your questions along with a self-addressed stamped envelope in care of MT, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.)

Q. I saw the question in the October MT Help Desk you answered about this Stanag 4285 protocol. What is it and where can I monitor some of these comms? (Anonymous via email)

A. STANAG is the NATO abbreviation for **Standardization Agreement**, which sets up processes, procedures, terms, and conditions for common military or technical procedures or equipment between the member countries of the alliance. Each NATO state ratifies a STANAG and implements it within its own military. The purpose is to provide a common set of operational and administrative procedures and logistics, so one member nation's military may use the stores and support of another member's military. STANAGs are published in English and French, the two official languages of NATO, by the NATO Standardization Agency in Brussels.

A general description of the STANAG 4285 NATO standard can be found on the SkySweeper website at: www.skysweeper.com/stanag_4285_decoder.htm. That description includes the following:

"STANAG 4285 is the NATO standard for HF communication. It consists of several sub modes (75-3600 bps) and two different interleaving options (short and long). The receiver should be in USB mode and provide flat frequency response from 600-Hz to 3000-Hz. The center frequency is set to 1800-Hz and cannot be changed."

A friend of *Monitoring Times*, Mr. Eddy Waters from Collinswood, South Australia, passes along the following Stanag 4285 protocol frequencies he has monitored recently (frequencies are in kHz and mode is USB):

NATO					
4041.5	4055.2	4112.6	4152.0	4169.0	4225.5
4228.0	4236.2	4237.2	4244.6	4253.2	4255.0
4263.2	4278.2	4280.6	4299.2	4305.2	4306.0
4307.2	4310.2	4317.2	4345.0	4346.0	4347.5
4372.0	4376.2	4401.8	4509.7	4532.7	4572.5
4576.2	4588.6	4590.0	4603.2	4643.0	4680.1
4686.0	4687.2	4781.7	4808.2	4810.2	4901.0
5048.0	5085.2	5101.0	5102.2	5148.2	5235.7
5246.2	5266.6	5278.0	5278.2	5278.6	5279.7
5282.0	5309.7	5332.0	5336.5	5348.2	5361.7
5362.2	5379.0	5427.7	5700.0	5732.7	5784.7
5786.5	5789.7	5848.2	6227.6	6249.2	6251.0
6253.2	6258.2	6259.2	6286.7	6335.2	6343.2
6360.6	6382.2	6388.7	6393.2	6398.7	6403.2
6405.2	6408.5	6408.7	6419.2	6423.2	6424.0
6428.2	6429.2	6442.2	6443.2	6465.0	6472.2
6490.5	6492.7	6493.2	6500.7	6711.2	6765.0
6780.7	6781.2	6787.7	6793.2	6794.5	6805.2
6842.6	6843.2	6881.0	6889.6	6892.0	6893.2
6903.2	6903.2	6968.0	7405.2	7406.2	7420.7
7467.2	7467.7	7601.2	7723.0	7776.7	7800.0
7843.2	7853.2	7982.0	8005.0	8008.2	8022.2
8027.2	8049.7	8073.7	8082.0	8098.2	8106.7
8108.5	8109.7	8138.0	8138.2	8156.2	8170.2
8170.5	8172.0	8178.2	8248.0	8271.2	8300.2
8340.0	8355.0	8456.2	8463.2	8468.2	8470.0
8474.2	8488.2	8508.0	8511.0	8524.2	8540.2
8541.0	8542.0	8552.6	8573.6	8612.2	8612.2

8618.2	8632.6	8661.0	8672.2	8695.2	8697.4
8698.2	8708.2	8793.6	9005.0	9028.6	9052.7
9095.0	9098.6	9100.5	9132.0	9270.0	9910.7
9956.2	10012.0	10111.5	10170.2	10186.1	
10233.2	10264.2	10274.2	10352.2	10352.2	
10353.2	10371.2	10408.2	10439.6	10449.7	
10478.0	10499.7	10522.0	10555.5	10559.2	
10561.0	10568.2	10568.7	10568.7	10569.2	
10599.0	10658.2	10669.2	10740.0	10741.7	
10742.0	10751.6	10758.2	10778.2	10807.2	
10807.7	10836.7	10948.2	10948.7	10967.2	
11000.0	11006.2	11015.0	11016.7	11021.2	
11042.7	11072.7	11105.2	11200.0	11228.0	
11405.5	11414.0	11455.2	11457.0	11538.2	
11540.0	12144.6	12154.2	12193.0	12203.2	
12221.0	12275.0	12305.7	12368.2	12386.0	
12396.0	12406.0	12416.2	12568.0	12570.0	
12661.2	12685.2	12691.2	12692.0	12704.5	
12715.2	12724.0	12749.2	12771.0	12784.2	
12804.2	12829.2	12847.2	12860.5	12873.6	
12883.6	12883.7	12913.0	12915.0	12930.7	
12932.2	12958.0	12958.2	12982.0	13057.6	
13072.2	13091.5	13410.0	13410.7	13411.6	
13413.7	13415.5	13445.0	13495.0	13588.2	
13917.2	13919.0	14320.0	14371.5	14376.2	
14385.2	14388.2	14442.2	14616.0	14638.2	
14723.7	14749.2	14870.0	14901.0	15000.0	
15851.0	16000.0	16028.2	16030.0	16158.2	
16205.0	16225.0	16250.0	16270.2	16333.2	
16356.7	16456.5	16574.2	16589.2	16611.6	
16656.0	16748.2	16790.0	16905.0	16916.2	
16921.8	16924.2	16925.0	16931.0	17060.6	
17082.2	17097.6	17106.6	17125.7	17130.0	
17135.6	17179.6	17192.6	17197.5	17200.2	
17202.2	17218.7	17219.0	17237.7	17378.2	
17799.2	17930.2	18045.0	18259.2	18366.0	
18367.5	18375.2	18493.5	18507.2	18532.7	
18538.0	18555.0	18598.4	18853.2	18855.0	
19714.2	19729.2	19730.2	19737.7	19800.0	
19830.2	19898.2	20000.0	20010.2	20151.0	
20160.2	20192.0	20290.0	20975.2	22178.5	
22188.2	22413.0	22544.6	26130.2		

Here are a few more from my personal monitoring notes:

CANFORCE	
CFH	8632.6
French Navy	
6WW	12855.1
FUE	6348.0
FUF	4810.2 8479.5 13031.2 16961.5
FUG	4288.6
FUJ	4271.0 8646.0 12664.5 16957.8 22461.3
FUM	8625.0 12666.5
FUO	6384.7 8451.0 12664.5
FUV	8568.0 13042.5 22447.2
FUX	4332.0 8473.5 12689.0
Dutch Navy	
4278.2	
German Navy	
DHJ59	6777.2 8333.5 12178.0
Italian Navy	
IDR/IGJ	2350.5 2804.2 3583.2 4031.0 4115.6 4225.2 4474.0 6316.2 6318.0 6323.2 6331.7 6433.7 8149.2 10605.7
Spanish Navy	
	8463.2 12930.7
US Navy	
	8326.6

Q. It seems that 5.680 and 7.257 were active a couple of nights ago. This was the first time I ever caught any activity on these

freqs. I believe they are Coast Guard frequencies. (Al via the Utility Listening Newsgroup)

A. I presume you mean 7527 kHz above, because 7257 kHz is a 40 meter ham frequency. The frequency 5680 kHz is, in fact, a US Coast Guard air to ground frequency, but 7527 kHz is part of the Immigration and Customs Enforcement (ICE) COTHEN (Customs over the Horizon Network) system. They carry traffic from a lot of agencies involved in the war on drugs. Since the Coast Guard was rolled into the Department of Homeland Security as well as ICE, they now share the COTHEN net as equal partners and we see a lot more activity on COTHEN by the Coast Guard.

Following is some information I recently posted on my *MT Milcom* blogspot (<http://mt-milcom.blogspot.com/>):

U.S. Immigration and Customs Enforcement (ICE)

The COTHEN (Customs Over the Horizon Enforcement Net) HF radio system has replaced the older JTF designated systems and those frequencies/designators have been discontinued.

5732.0	Scan 1
7527.0	Scan 2
8912.0	Scan 3
10242.0	Scan 4
11494.0	Scan 5
13907.0	Scan 6
15867.0	Scan 7
18594.0	Scan 8
20890.0	Scan 9
23214.0	Scan 10
25350.0	Scan 11

Q. Is there any way for me to build a simple to moderately difficult kit that will up convert my VHF frequencies to UHF milband? Or, is it more efficient/cost effective to splurge on a UHF capable scanner, as I don't have a whole lot to spend? My feeling is the latter; however, I would like to hear your input. (Jacob via email)

A. Given the large amount of older non-trunk scanners in the marketplace that cover the 225-400 MHz UHF milair band, I would definitely say a dedicated scanner is the way to go. Besides, I haven't seen many kits floating around to convert VHF to UHF. The last piece of equipment I saw along those lines was a Grove VHF-UHF Converter that used stack frequency technology, but that has been long gone from the radio hobby marketplace. I recommend any of the many scanners that cover the milair band now.

Sheboygan Scanning is a Life Saver

If you're looking for New Years resolutions that might be easier to keep, perhaps one of them can be to keep a scanner nearby. One man in Wisconsin found that his scanner was useful in a very important and surprising way.

❖ Sheboygan Falls, Wisconsin

Although many readers may consider a scanner essential to their everyday activities, for one man in Sheboygan Falls, Wisconsin, it was a literal lifesaver. Floyd G. Kimme, 50, was sitting in his living room one evening in November when a bullet suddenly crashed through the wall of his home. The bullet then struck a scanner positioned between the wall and Floyd and was deflected away from him.



Sheboygan County

A drive-by shooting is suspected and the Sheboygan County Sheriff Department is investigating.

Sheboygan Falls lies roughly between the city of Sheboygan and Elkhart Lake, the home of the four-mile road course race track *Road America*. It lies within Sheboygan County, between Milwaukee and Green Bay. Sheboygan Falls proper has about 7,000 residents, while the county as a whole is home to over 112,000.

Sheboygan County operates a Motorola Type II trunked radio system from six repeater sites across the county, located as follows:

1. Erie Avenue at Taylor Drive in Sheboygan
2. Highway CC and D in Random Lake
3. Tower Road just north of Beechwood
4. Highway 67 in Plymouth
5. Highway V and VN in Waldo
6. Highway 67 south of Plymouth

Eight frequencies are reported to be in operation: 866.3125, 866.6125, 867.1250, 867.6250, 868.0750, 868.3125, 868.5125 and 868.7250 MHz. Four additional frequencies are licensed to the county and may be added to the trunked radio system in the future: 866.0625, 867.1500, 867.7125 and 868.6250 MHz.

A number of state, county and local agencies use the system. Talkgroups include:

Decimal	Hex	Description
2256	08D	Elkhart Lake Fire
2288	08F	Elkhart Lake Fire
2320	091	Elkhart Lake Fire
2352	093	Elkhart Lake Police
2384	095	Elkhart Lake Public Works
7728	1E3	Sheboygan Falls Fire (Operations)
7760	1E5	Sheboygan Falls Fire
7792	1E7	Sheboygan Falls Police
7824	1E9	Sheboygan Falls Citywide
7856	1EB	Sheboygan Falls Public Works
7888	1ED	Sheboygan Falls Utilities
8528	215	Sheboygan Falls Fire
8560	217	Sheboygan Falls Fire
8592	219	Sheboygan Falls Fire
8624	21B	Sheboygan Falls Fire
8720	221	Sheboygan Falls Police
10160	27B	City Fire (Dispatch)
10192	27D	City Fireground 2
10224	27F	City Fireground 3
10256	281	City Fire Training
10288	283	City Fire Inspector
10320	285	City Fire
10448	28D	City Police (Dispatch)
10480	28F	City Police Traffic
10512	291	City Police Tactical 1
10544	293	City Police Tactical 2
10704	29D	City Police
10768	2A1	City Police/Public Works
10800	2A3	City Main
10832	2A5	City Supervisors
10864	2A7	City Engineers 1
10896	2A9	City Engineers 2
10928	2AB	City Streets
10960	2AD	City Sanitation
10992	2AF	City Forestry
11024	2B1	City Parks
11056	2B3	City Electricians
11088	2B5	City Sewers
11120	2B7	City Marina
11152	2B9	City Building Inspector
11184	2BB	City Housing Authority
11216	2BD	City Parking
11248	2BF	City Transit 1
11280	2C1	City Transit 2
11312	2C3	City Transit 3
11344	2C5	City Transit 4
11376	2C7	City Water Utility 1
11408	2C9	City Water Utility 2
11440	2CB	City Water Utility 3
11472	2CD	City Water Utility 4
11536	2D1	Citywide 1
11568	2D3	Citywide 2
11600	2D5	Citywide 3
11632	2D7	Citywide 4
11504	2CF	City Fleet Watch
12816	321	County Fire (Announcements)
12848	323	County Fire Primary Dispatch (Simulcast on 154.415 MHz)
12880	325	County Fire Secondary Dispatch
12912	327	Fireground Group 1 Tactical A
12944	329	Fireground Group 1 Tactical B
12976	32B	Fireground Group 1 Tactical C
13008	32D	Fireground Group 2 Tactical A
13040	32F	Fireground Group 2 Tactical B
13072	331	Fireground Group 2 Tactical C
13104	333	Fireground Group 3 Tactical A
13136	335	Fireground Group 3 Tactical B
13168	337	Fireground Group 3 Tactical C
13200	339	Fireground Group 4 Tactical A
13232	33B	Fireground Group 4 Tactical B
13264	33D	Fireground Group 4 Tactical C

13296	33F	County EMS (Primary)
13328	341	County Fire Tactical
13360	343	County Fire Tactical
13392	345	County Fire Tactical
13424	347	County Fire Tactical
13456	349	County Fire Tactical
13488	34B	County EMS Secondary
13520	34D	County EMS Coordination 1
13552	34F	County EMS Coordination 2
13584	351	County EMS Coordination 3
13616	353	County EMS Coordination 4
13648	355	County EMS Coordination 5
13680	357	County EMS Coordination 6
14128	373	Orange Cross Ambulance (Dispatch)
14160	375	Orange Cross Ambulance (Secondary)
14288	37D	Sheboygan Memorial Hospital
14320	37F	St. Nicholas Hospital
14352	381	Valley View Medical Center
14416	385	County Sheriff (Announcements)
14448	387	County Sheriff (Dispatch)
14480	389	County Sheriff (Secondary)
14512	38B	County Sheriff Bailiffs
14544	38D	County Sheriff
14576	38F	County Sheriff
14608	391	County Sheriff
14640	393	County SWAT
14672	395	County Sheriff Tactical 1
14704	397	County Sheriff Tactical 2
14736	399	County Sheriff Tactical 3
14768	39B	County Sheriff Tactical 4
14800	39D	County Sheriff (Emergency)
16016	3E9	County Highway (Announcement)
16048	3EB	County Highway (Operations)
16080	3ED	County Highway
16112	3EF	County Highway (Sheriff)
16144	3F1	County Highway 1
16176	3F3	County Highway 2
16208	3F5	County Highway 3
16240	3F7	County Highway 4
16272	3F9	County Highway 5
16304	3FB	County Highway 6
16336	3FD	County Highway 7
16368	3FF	County Highway 8
16400	401	County Highway 9
16432	403	County Highway 10
17424	441	Coroner
18096	46B	State Patrol District 3 (simulcast on 154.935 MHz)
18128	46D	State Patrol District 3 (Car-to-Car)
18160	46F	State Patrol District 3 (Tactical)

The area also has a number of conventional frequencies in use by public safety and service agencies.

Frequency	Description
151.280	Mutual Aid Radio Channel (MARC)
151.625	County Fairgrounds
154.415	County Fire (Simulcast on talkgroup 12848)
154.570	County Fairgrounds
154.600	County Fairgrounds
154.725	City Police (simulcast on talkgroup 10448)
155.160	National Search and Rescue
155.220	Orange Cross Ambulance
155.340	County EMS
155.370	Law Enforcement Point-to-Point
155.400	County EMS
155.475	Wisconsin Police Emergency Radio Network (WISPERN)
155.685	County Sheriff

453.9500	Regional Wastewater Treatment Plant
453.5500	Regional Wastewater Treatment Plant
453.2000	Sheboygan Area Transit (simulcast on 11248)
462.6750	County Storm Spotters
854.9875	County Jails
855.9875	County Jails
856.2625	County Sheriff Talk-Around
860.2625	County Sheriff Talk-Around

It's also worth checking the National Calling Plan frequencies to monitor mutual aid activity:

Frequency	Description
866.0125	Interagency Calling (ICALL)
866.5125	Interagency Tactical (ITAC) 1
867.0125	Interagency Tactical (ITAC) 2
867.5125	Interagency Tactical (ITAC) 3
868.0125	Interagency Tactical (ITAC) 4

The County Sheriff also operates Mobile Data Terminals on 857.2625 and 854.9625 MHz.

❖ Louisville, Kentucky

The city of Louisville, Kentucky, has hired a consultant to help them through the process of acquiring a new public safety radio system. Roger Schipke, a former corporate leader and current executive-in-residence at the University of Louisville, will start by leading a group reviewing bids from radio equipment providers.



The new radio communication network is called MetroSafe. Under this effort, the city has already consolidated police, fire and medical dispatch into a single facility located on Barret Avenue. All dispatchers are now using the same computer aided dispatch (CAD) software, making coordination easier and improving response time.

About \$23 million has been spent so far, and the city would like to keep the total amount somewhere under \$71 million. Unfortunately, the first bid for new radios and repeater equipment came in at \$60 million – much higher than the city had hoped. With Schipke's help, Louisville expects to find an acceptable way forward within the next few months and have the new system installed in less than two years.

The radio portion of MetroSafe is expected to have at least 10 repeater sites operating on at least 30 radio frequencies in the 700 MHz and/or 800 MHz bands. An estimated 5,000 users would utilize the new network, including 1300 sworn law enforcement officers and just over 600 full-time firefighters and emergency medical personnel. The Louisville Metro Police Department, a key user of the new system, is a combined city-county agency covering the city of Louisville and Jefferson County, serving approximately 700,000 residents.

Until MetroSafe is in operation, much of the public safety radio traffic occurs on conventional (non-trunked) VHF and UHF frequencies listed here:

Frequency	Description
154.010	County Fire Incident Command
154.160	County Fire West
154.250	County Fire East
154.295	County Fire Mutual Aid
154.370	County Fire South
154.400	County Fire Tactical
154.445	County Fire Dispatch
154.740	Louisville Police Dispatch (Suburban South and West)
154.830	Louisville Police (Suburban Car-to-Car)
154.860	Louisville Police Dispatch (Suburban Far East and Far West)
155.070	Louisville Suburban Police
155.265	County Fire Hazardous Materials
155.340	Louisville Emergency Medical Service
155.580	Louisville Suburban Police
158.775	County Public Schools Security
453.0250	County EMS Operations
453.0750	County EMS Operations
453.1250	County EMS Operations
453.1750	County EMS Operations
453.2000	University of Louisville Police
453.2750	Transit Authority of River City (TARC) busses
453.3250	Transit Authority of River City (TARC) busses
453.3750	County Animal Control
453.4000	County Sheriff
453.5750	Louisville Police
453.6750	County Sheriff Dispatch
453.8750	County Housing Authority
453.9750	County Sheriff Dispatch
458.3375	County Sheriff
460.0250	Louisville Police Dispatch (Divisions 1 and 2)
460.1000	Louisville Police
460.1500	Louisville Police Dispatch (Divisions 4 and 5)
460.2000	County Sheriff
460.2250	Louisville Police (Car-to-Car)
460.2500	Transit Authority of River City (TARC) busses
460.3750	Louisville Police
460.4750	Louisville Police (common with Suburban Law Enforcement)
460.5500	Louisville Fire Operations (Primary)
460.5750	Louisville Fire Operations (Secondary)
460.6000	Louisville Fire Operations (Investigators, Inspections)
460.6250	Louisville Fire Dispatch
462.9500	Louisville Emergency Medical Service (Dispatch)
462.9500	County EMS Medical 9
462.9750	County EMS Medical 10 (Dispatch)
463.0000	County EMS Medical 1
463.0250	County EMS Medical 2
463.0500	County EMS Medical 3
463.0750	County EMS Medical 4
463.1000	County EMS Medical 5
463.1250	County EMS Medical 6
463.1500	County EMS Medical 7
463.1750	County EMS Medical 8

❖ Mississippi

The state of Mississippi has selected Motorola to build a statewide radio network. In November the Mississippi Wireless Communication Commission unanimously approved a \$221 million bid from Motorola, rejecting a competing bid from M/A-COM that came in nearly \$90 million higher. This approval comes after nearly ten years of discussion and planning for a network that will tie together disparate systems within the state. Mississippi, like many other states, has a patchwork of incompatible systems that were installed over decades without a comprehensive plan to work together. The goal of the new system is to allow state, county, municipal and even federal agencies to be able to communicate directly with each other.

The state and Motorola have yet to work out all of the details related to the new system, including who will run it, who will maintain it, and exactly how it will be funded. One issue that

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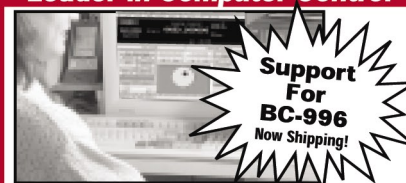
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may cause trouble is local control; specifically, how to convince towns and counties to participate in the new network.

One problematic area may be the capital city of Jackson, which currently operates a M/A-COM EDACS (Enhanced Digital Access Communication System) trunked radio system. There is currently limited interoperability between Jackson's system and the Motorola Type II trunked radio system run by Hinds County, in which Jackson is located. The state's selection of Motorola may eventually result in changes to the city's radio equipment.

Mississippi is requiring the new system to provide coverage across at least 97 percent of the state and provide capacity for at least 64,000 radios. Based on experience with Hurricane Katrina, each repeater site will also be required to have significant backup power capability during emergencies.

Installation of the new system is expected to begin on the Gulf Coast and proceed northward from there. The entire installation process is expected to take about five years.

❖ Jackson, Mississippi

The Jackson EDACS system uses nineteen frequencies in the 800 MHz band. When programming your scanner, remember that EDACS systems require that the frequencies be entered in Logical Channel Number (LCN) order.

LCN	Frequency
01	855.2125
02	855.4875
03	855.7375
04	856.2125
05	856.4875
06	856.7375
07	857.4875
08	857.7375
09	858.4875
10	858.7375
11	858.9375
12	859.4875
13	859.7375
14	859.9375
15	860.4875
16	860.7375
17	860.9375
18	860.4625
19	860.9625

Remember that talkgroups in an EDACS system use an Agency-Fleet-Subfleet organization rather than the signal hexadecimal code found in Motorola systems.

Decimal	AFS	Description
273	02-021	Public Works (All Call)
274	02-022	Engineers
275	02-023	Public Works (Electrical)
276	02-024	Water Treatment Plant
277	02-025	Water Department
278	02-026	Sewer
280	02-030	Sanitation
282	02-032	Sanitation
284	02-034	Water Department
285	02-035	Water Department
290	02-042	Jackson Transit Authority
291	02-043	Jackson Transit Authority (Primary)
292	02-044	Building Inspectors
293	02-045	Animal Control
529	04-021	Precinct 1 (Operations)
530	04-022	Precinct 1 (Car to Car)
531	04-023	Precinct 1 (Tactical)
532	04-024	Precinct 1 (Special Operations)

533	04-025	JPD Information
545	04-041	Precinct 2 (Operations)
546	04-042	Precinct 2 (Car-to-Car)
547	04-043	Precinct 2 (Tactical)
548	04-044	Precinct 2 (Special Operations)
552	04-050	Jackson State University Police (Dispatch)
553	04-051	Jackson State University Police (Car-to-Car)
554	04-052	Jackson State University Police (Tactical)
555	04-053	Jackson State University Police (Special Operations)
556	04-054	Jackson State University Police (Sports)
557	04-055	Jackson State University Police (Sports)
561	04-061	Precinct 3 (Operations)
562	04-062	Precinct 3 (Car-to-Car)
563	04-063	Precinct 3 (Tactical)
564	04-064	Precinct 3 (Special Operations)
565	04-065	Truancy Unit
577	04-081	Precinct 4 (Operations)
578	04-082	Precinct 4 (Car to Car)
579	04-083	Precinct 4 (Tactical)
580	04-084	Precinct 4 (Special Operations)
593	04-101	Detectors (Dispatch)
594	04-102	Detectors (Car-to-Car)
595	04-103	Detectors (Tactical)
596	04-104	Detectors (Special Operations)
597	04-105	Detectors (Robbery/Homicide)
598	04-106	Detectors (Vice)
599	04-107	Detectors (Narcotics)
600	04-110	Detectors (Surveillance)
601	04-111	Crime Scene Investigation
602	04-112	Detectors (Anti-Gang Task Force)
603	04-113	Administration
604	04-114	Mutual Aid (Citywide)
605	04-115	Emergency
608	04-120	Court Services
609	04-121	SWAT
610	04-122	Mobile Command Unit
784	06-020	Fire Station Alarms
785	06-021	Fire Dispatch
786	06-022	Fireground 1
787	06-023	Fireground 2
788	06-024	Fireground 3
789	06-025	Fireground 4
790	06-026	Fireground 5
791	06-027	Fireground 6
792	06-030	Fireground 7
793	06-031	Fireground 8
794	06-032	Fireground 9
801	06-041	Administration 1
2045	15-155	Fire Station Alerting

❖ Virginia Ten Codes

Virginia is the latest state to follow federal guidelines and officially give up the use of ten-codes over the radio. As part of an effort to improve interoperability between different agencies and organizations, the federal government has recommended the use of plain English by public service personnel.

Most people recognize "10-4" (acknowledged) and "10-20" (location), but over time different organizations have assigned different meanings to many of the other codes. This can create significant confusion if officers from different departments speak directly with each other and use their own versions of the ten-code.

The Department of Homeland Security (DHS) developed the *National Incident Management System* (NIMS), which specifies a set of recommended procedures and practices for public service agencies to follow during an emergency. A Presidential Directive makes it a requirement for federal agencies to use NIMS in their programs and activities. It also makes the use of NIMS a requirement for states and local organizations that wish to receive emergency

preparedness assistance from the federal government.

Despite that, convincing personnel to change their deeply ingrained habits is going to be a challenge. Most police officers appreciate the brevity and efficiency of the codes and many believe it helps create a public perception of professionalism. Some have voiced concern that the use of plain English would allow scanner listeners to understand what is being discussed, despite the fact that most of the departmental ten-codes are available on the Internet.

❖ Westport, Connecticut

Police and fire personnel in Westport, Connecticut, are now using their new \$3 million trunked radio system. The Police Department began using the system in April, but it took until the end of September to get the Fire Department moved over. The new system transmits from two locations in Westport, one on Bayberry Lane and the other on Post Road East.

Westport is a well-to-do Connecticut town of about 26,000, located in Fairfield County on the Atlantic Coast. The town has had a number of famous residents, including Rodney Dangerfield, Don Imus, Paul Newman, Harry Reasoner, and Martha Stewart.

Town radio operations use both traditional analog technology and Association of Public-Safety Communications Officials (APCO) Project 25 standards to communicate. The Project 25 transmissions on the new system are in digital format and require one of the new digital-capable scanners from Radio Shack or Uniden to monitor.

Radio frequencies on the Westport system are operated *conventionally* rather than as a pool of *trunked* frequencies. In a conventional system, each radio frequency is dedicated to a specific function rather than being shared between many different user groups.

In Westport, the following frequencies are used conventionally and carry analog voice traffic:

Frequency	Description
45.76	Highway Department
46.42	Fire Tones
155.355	Emergency Medical Services
166.250	Fire Station Alert
453.4000	Fire Tactical (Secondary)
458.0500	Fire Tactical (Primary)
477.2500	Fire (Mutual Aid)

The following four frequencies are also used conventionally and carry voice traffic using the APCO Project 25 Common Air Interface (CAI):

Frequency	Description
460.5750	Fire Administration
460.6250	Fire Operations
855.7125	Police (Dispatch)
866.9250	Police

That's all for this month. As always, I welcome your e-mail at danveeneman@monitoringtimes.com. You can also find more radio-related information on my web site at www.signalharbor.com. Until next month, keep scanning and have a Happy New Year!

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Size: 7.06" Wide x 6.10" Deep x 2.44" High

Frequency Coverage: 25,000-54,000 MHz., 108,000-174,000 MHz., 400,000-512,000 MHz., 806,000-956,000 MHz., 849,0125-868,9950 MHz., 894,0125-956,000 MHz.

The Bearcat BCT8 scanner, licensed by NASCAR, is a superb preprogrammed 800 MHz trunked highway patrol system scanner. Featuring TrunkTracker III, PC Programming, 250 Channels with unique BearTracker warning system to alert you to activity on highway patrol link frequencies. Preprogrammed service searches makes finding interesting active frequencies even easier and include preprogrammed police, fire and emergency medical, news agency, weather, CB band, air band, railroad, marine band and department of transportation service searches. The BCT8 also has preprogrammed highway patrol alert frequencies by state to help you quickly find frequencies likely to be active when you are driving. The BCT8 includes AC adapter, DC power cable, cigarette lighter adapter plug, telescopic antenna, window mount antenna, owner's manual, one year limited Uniden warranty, frequency guide and free mobile mounting bracket. For maximum scanning enjoyment, also order the following optional accessories: External speaker ESP20 with mounting bracket & 10 feet of cable with plug attached \$19.95. Magnetic Mount mobile antenna ANTMMBNC for \$29.95.



Bearcat® BCD396T Trunk Tracker IV

Suggested list price \$799.95/CEI price \$519.95

APCO 25 9,600 baud compact digital ready handheld TrunkTracker IV scanner featuring Fire Tone Out Paging, Close Call and Dynamically Allocated Channel Memory (up to 6,000 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.40" Wide x 1.22" Deep x 5.35" High

Frequency Coverage:

25,000-512,000 MHz., 764,000-775,9875 MHz., 794,000-823,9875 MHz., 849,0125-868,9765 MHz., 894,0125-956,000 MHz., 1240,000 MHz - 1300,000 MHz.

The handheld BCD396T scanner was designed for National Security/Emergency Preparedness (NS/EP) and homeland security use with new features such as **Fire Tone Out Decoder**. This feature lets you set the BCD396T to alert if your selected two-tone sequential paging tones are received. Ideal for on-call firefighters, emergency response staff and for activating individual scanners used for incident management and population attack warning.

Close Call Radio Frequency Capture - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. Useful for intelligence agencies for use at events where you don't have advance notice or knowledge of the radio communications systems and assets you need to intercept. The BCD396T scanner is designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS, LTR and EDACS analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. **Dynamically Allocated Channel Memory** - The BCD396T scanner's memory is organized so that it more closely matches how radio systems actually work. Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 3,000 channels are typical but **over 6,000 channels are possible** depending on the scanner features used. You can also easily determine how much memory you have used and how much memory you have left. **Preprogrammed Systems** - The BCD396T is preprogrammed with over 400 channels covering police, fire and ambulance operations in the 25 most populated counties in the United States, plus the most popular digital systems. **3 AA NiMH or Alkaline battery operation and Charger** - 3 AA battery operation - The BCD396T includes 3 premium 2,300 mAh Nickel Metal Hydride AA batteries to give you the most economical power option available. You may also operate the BCD396D using 3 AA alkaline batteries. **Unique Data Skip** - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. **Memory Backup** - If the battery completely discharges or if power is disconnected, the frequencies programmed in the BCD396T scanner are retained in memory. **Manual Channel Access** - Go directly to any channel. **LCD Back Light** - A blue LCD light remains on when the back light key is pressed. **Autolight** - Automatically turns the blue LCD backlight on when your scanner stops on a transmission. **Battery Save** - In manual mode, the BCD396T automatically reduces its power requirements to extend the battery's charge. **Attenuator** - Reduces the signal strength to help prevent signal overload. The BCD396T also works as a conventional scanner to continuously monitor many radio conversations even though the message is switching frequencies. The BCD396T comes with AC adapter, 3 AA nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, SMA/BNC adapter, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. Order on-line at www.usascan.com or call 1-800-USA-SCAN.



Bearcat® BC246T Trunk Tracker III

Suggested list price \$399.95/CEI price \$214.95

Compact professional handheld TrunkTracker III scanner featuring Close Call and Dynamically Allocated Channel Memory (up to 2,500 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.72" Wide x 1.26" Deep x 4.6" High

Frequency Coverage:

25,000-54,000 MHz., 108,000-174,000 MHz., 216,000-224,9800 MHz., 400,000-512,000 MHz., 806,000-823,9875 MHz., 849,0125-868,9875 MHz., 894,0125-956,000 MHz., 1240,000 MHz - 1300,000 MHz.

The handheld BC246T TrunkTracker scanner has so many features, we recommend you visit our web site at www.usascan.com and download the free owner's manual. Popular features include **Close Call Radio Frequency Capture** - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. **Dynamically Allocated Channel Memory** - Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 1,600 channels are typical but **over 2,500 channels are possible** depending on the scanner features used. You can also easily determine how much memory is used. **Preprogrammed Service Search (10)** - Makes it easy to find interesting frequencies used by public safety, news media TV broadcast audio, Amateur (ham) radio, CB radio, Family Radio Service, special low power, railroad, aircraft, marine, racing and weather frequencies. **Quick Keys** - allow you to select systems and groups by pressing a single key. **Text Tagging** - Name each system, group, channel, talk group



ID, custom search range, and S.A.M.E. group using 16 characters per name. **Memory Backup** - When power is lost or disconnected, your BC246T retains the frequencies that were programmed in memory. **Unique Data Skip** - Allows the BC246T to skip over unwanted data transmissions and birdies. **Attenuator** - You can set the BC246T attenuator to reduce the input strength of strong signals by about 18 dB. **Duplicate Frequency Alert** - Alerts you if you try to enter a duplicate name or frequency already stored in the scanner. **22 Bands** - with aircraft and 800 MHz. The BC246T comes with AC adapter, 2 AA 1,800 mAh nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. For more fun, order our optional deluxe racing headset part #HF24RS for \$29.95. Order now at www.usascan.com or call 1-800-USA-SCAN.

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Cuban Morse "Numbers" Frequencies

Along with the voice "numbers" discussed last month, Cuban intelligence also has a huge Morse schedule. It has just as many frequencies as the voice, and more hours. It uses the same powerful transmitters, some of which might also broadcast Radio Havana on occasion. Presumably, it has the same mission, which is to send heavily encrypted messages and/or dummy traffic to deep-cover agents recruited from within the population of target countries, including the United States.

These transmitters can really blast. It's sometimes hard to believe such a strong signal comes all the way from Cuba. Of course, there is the one case where it didn't. It's the 10226 kilohertz (kHz) slot described at length by this magazine in its October cover story.

As one of the "experts" mentioned (and being in on the story since last winter), I am willing to stake 30 years of experience and agree with their findings. They did as professional a high-frequency direction-finding (HFDF) job as anyone ever could with equipment available to civilians. Other amateurs did triangulations from somewhat different locations, and got the same results. There is good confidence that the transmitter was in the United States, and not the Ottawa embassy, despite their alleged use of HF in the past.

Now, it seems weird that anyone would want to attract this kind of attention by broadcasting spy messages from Pennsylvania, in the middle of a quiet amateur band, at an hour when skip propagation is all but gone in the winter, but then Cuba has done stranger things on the radio. Unfortunately, this schedule stopped before anyone could drive up to the fence and take pictures. We sure hope it comes back this winter.

Other transmissions come from Cuba. The current format is M8a, as designated by ENIGMA 2000, the online incarnation of the European Numbers Intelligence Gathering and Monitoring Association. Another format appeared just long enough to become M8d, but it seems dormant at present. Meanwhile, the M8a structure is the same as the voice messages, with repetition of three 5-number groups designating the three messages of equal length. These also come in 5-number groups.

People report M8a as "5-letter" groups, because that's actually what they are. The catch is that these numbers are "cut." In other words, they are *numbers sent as letters* to save time. This is nothing new in Morse telegraphy, but the Cuban sequence is completely distinctive. The first couple of numbers and the zero are logical enough, but no one has been able to explain how they came up with

the others. Be that as it may, the numbers 1 through 0 substitute as follows: ANDUWRIGMT. I wrote a Microsoft Word macro to do the substitution in long messages.

ANDUWRIGMT

1234567890

Emission can be simple CW ("Continuous Wave"), or MCW, modulated CW. This MCW version is just tone audio in full-carrier amplitude modulation (AM). This particular transmitter came up last summer, and it's just as technically grungy as ever. As always, frequencies are plus or minus a couple of kHz, and they are subject to any imaginable technical malfunction or operator goof.

The frequency list appears in Table 1. Consider this hunting territory, as M8a is nowhere near as consistent as the voice. (In Cuba, that's pretty inconsistent.) For that reason I also left out the days of the week. Good hunting!

LORAN-C Changes

LORAN-C is another of those hyperbolic radio navigation systems like the discontinued DECCA and HYPERFIX. It is a ground wave system, operating on 100 kilohertz (kHz). This low frequency is less subject to errors from sky wave signals. Pulse power levels are in the hundreds of kilowatts, or even megawatts at some stations. Tech fans should check out the transmitter circuits, which are unique, to say the least.

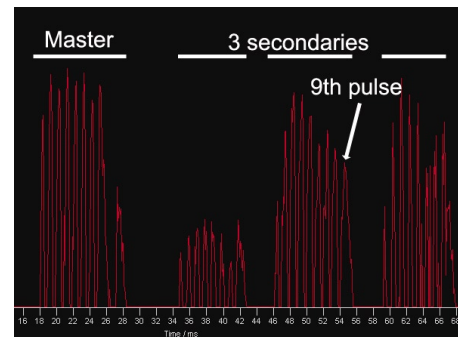
Like other terrestrial modes, LORAN-C was left for dead after the coming of the space-based Global Positioning System (GPS). Some transmitter chains went dark around 2005. However, LORAN-C's high field strength suggested a solution to problems caused by the very low GPS signal levels. Several countries, including the United States, have put off LORAN-C's demise long enough to study its role as a backup or complement to GPS.

Currently, the US Federal Aviation Administration and the US Coast Guard are testing an addition called the LORAN Data Channel (LDC). The way this works is by adding a ninth pulse to the eight sent by secondary stations in the chain. Not every secondary station has a ninth pulse, just the ones participating in the test. This doesn't change the sound, which is basically just a cyclic banging, but the extra pulse is very easy to spot on a scope or a computer plotter set to that chain's Group Repetition Interval (GRI, in microseconds).

The modulation scheme is pulse position modulation, allowing 32 character states achieved by different delays from the 1000-microsecond

zero state. The test messages look interesting, with several formats available for station identification, quality control announcements, and even range corrections to make both GPS and LORAN-C navigation more accurate. Unfortunately, I know of no way to decode these with hobby equipment — not yet, anyway.

The US Coast Guard has a Web page explaining the LDC, with links to tech documents and user guides. It's at www.navcen.uscg.gov/loran/modernization.htm.



Plot made from LORAN-C chain 9940, showing a ninth pulse on the middle secondary burst.

Table 1: M8a TIMES and FREQUENCIES

UTC	kHz
0000	None at present
0100	12119
0200	10714
0300	4027 10344 10444
0400	3292 3296 4329 4479 9063 9330 10235 11565
0500	3389 5927 5930 8096 9063 10119 10235 11565
0600	5800 6786 7887 8097 9331
0700	5930 8097
0800	10236
0900	5930 6786 8630 9323
1000	5800 7726 8136 9153 9240 9323
1100	4027 4478 8136 9238 10345 10446
1200	9152
1300	5116 5134 5761 7519 9153
1400	5134 5416 5798 5883 6867
1500	None at present
1600	9012
1700	10446 10715
1800	8097?
1900	6783 7650 7980 8097?
2000	7554 7887 8009
2100	6932 7519 7974
2200	6855* 7480 7519 7526 8009
2300	8009 8135

? Reported, but possible operator mistake

* Possibly run off by broadcast interference

ABBREVIATIONS USED IN THIS COLUMN

AFB.....	Air Force Base
ALE.....	Automatic Link Establishment
AM.....	Amplitude Modulation
ARQ.....	Automatic Repeat Request
AWACS.....	Airborne Warning and Control System
CAMSLANT.....	Communication Area Master Station, Atlantic
CAMSPAC.....	Communication Area Master Station, Pacific
CW.....	On-off keyed "Continuous Wave" Morse telegraphy
DEA.....	US Drug Enforcement Administration
DSC.....	Digital Selective Calling
E3.....	Lincolnshire Poacher, female voice with musical tune
E10.....	Israeli phonetic station (xxx2=null message)
EPA.....	US Environmental Protection Agency
FAX.....	Radiofacsimile
FEC.....	Forward Error Correction
FEMA.....	US Federal Emergency Management Agency
HFDL.....	High-Frequency Data Link
HF-GCS.....	High-Frequency Global Communication System
JSTARS.....	Joint Surveillance Target Attack Radar System
LSB.....	Lower Sideband
M8a.....	Cuban 3-msg CW/MCW, ANDUWRIGMT = 1-0
MARS.....	Military Affiliate Radio System
Meteo.....	Meteorological
MCW.....	Modulated CW or AM tone Morse telegraphy
MMSI.....	Maritime Mobile Service Identifier
NPHRN.....	US National Public Health Radio Network
RSA.....	Republic of South Africa
RTTY.....	Radio Teletype
S28.....	Buzzy Russian marker for UZB76, occasional voice
Selcal.....	Selective Calling
SITOR-A.....	Simplex Telex Over Radio, ARQ mode
SITOR-B.....	Simplex Telex Over Radio, FEC mode
Unid.....	Unidentified
US.....	United States
USCG.....	United States Coast Guard
UK.....	United Kingdom
V21.....	Cuban fast-talking/singing live Spanish
V2a.....	"Atencion" Spanish numbers, 3-msg format
Volmet.....	From French, loosely "Flying Weather"
XPA.....	New Russian Polytone, unknown multifrequency mode

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ().

4018.7	AAA7IA-US Army MARS, SITOR-B net with AAR7MJ and AAR7MQ, at 0107. (Tom Severt-KS)
4174.0	Cuban Spanish numbers (V2a), in USB with callup 20081 57461 05651 and 5-figure group messages, at 0301. (Severt-KS) [They were also caught in lower sideband once this month. Too weird. -Hugh]
4270.0	PCD-Israeli Intelligence (E10), phonetic callup and message at 1935. (Mike L.-West Sussex, UK)
4271.0	CFH-Canadian Forces, Halifax, NS, RTTY weather at 0153. (Severt-KS)
4318.0	NMG-USCG New Orleans, LA, FAX satellite image of Atlantic, at 0202. (Severt-KS)
4336.7	VTH5-Indian Navy, Mumbai, RTTY marker at 1545. (Bob Hall-RSA)
4346.0	NMC-USCG CAMSPAC Point Reyes, CA FAX satellite image of Pacific, at 0142. (Severt-KS)
4369.0	WLO-Shipcom/ Mobile Radio, AL, synthesized "female" voice with weather, parallel on 4396, at 0512. (Severt-KS) WLO, services list and tropical weather, then holding traffic for fishing vessel <i>Grandpa's Dream</i> , at 0200. WLO, services and Hurricane Isaac advisory, then holding traffic for motor vessel <i>Atlas Tide</i> , parallel 8780, at 1601. (Cyclops-TX)
4372.0	"5-Delta-Foxtrot"-US Navy, working "Zulu-2-Papa" at 1254. (Mark Cleary-SC)
4443.5	R24391-US Army helicopter, calling T1Z137 (1-137th Avia-

4469.0	tion) in ALE, at 2227. (Cleary-SC)
	Florida CAP 90-US Civil Air Patrol, opening net at 1131. (Cleary-SC)
4625.0	The Buzzer-Russian military, buzzy channel marker (S28), at 0000. (Eric Christensen-NC)
4780.0	Elwood Armory-Indiana National Guard, calling Golden Pirate, IN, in LSB at 1426. (Jack Metcalfe-KY)
4804.0	NNN0FAH-US Navy/Marine Corps MARS, net at 1407. (Metcalfe-KY)
4880.0	ULX2-Israeli Intelligence (E10), callup only at 0230. (Christensen-NC)
5058.5	CL1-US Federal Bureau of Investigation, Cleveland, OH, calling OM2, FBI, Omaha, NE, ALE at 0607. (Cleary-SC)
5178.0	Russian Polytone (XPA), audio tone code, Tuesday at 2040 Same XPA message, AM mode, Friday at 2040. (Mike L.-UK)
5320.0	District 7-USCG, FL, radio checks with Sector St. Petersburg, Sector Jacksonville, and Coast Guard Air Station Clearwater, at 1301. (Cleary-SC)
5649.0	Gander-North Atlantic oceanic air control, NFD, Canada, selcal check with airliner KLM 652, at 0213. (Severt-KS)
5680.0	Rescue 122-UK Coast Guard, working Kinloss Rescue Coordination Centre, at 1935. (Patrice Privat-France)
5690.0	Rescue 2112-USCG, patch to District 7 Miami Ops, FL, also on 8980, at 2320. (Cleary-SC)
5696.0	E-City Air-USCG, Elizabeth City, NC, working Juliet 6001 at 1847. (Cleary-SC)
5708.0	450027-US Air Force KC-10A tanker, calling HIK (Hickam AFB, HI), ALE at 0257. (Cleary-SC)
5711.0	USDAEOC2-US Department of Agriculture Emergency Operations Center, MD, working NCS015, National Communications System auxiliary station, VA, in ALE at 1501. (Metcalfe-KY)
5732.0	CAMSLANT-USCG, relay from Sector Key West to Coast Guard 1720, at 1441. (Cleary-SC)
5800.0	Cuban "cut" Morse numbers (M8a), CW 5-figure groups at 0600. (Severt-KS) [New slot in fall '06. -Hugh]
5820.0	KTQ316-Probable EPA, calling FL4FMA and AL4, both FEMA Region 4, in ALE on the NPHRN, at 1659. (Metcalfe-KY)
5883.0	Cuban AM Spanish numbers (V2a), in progress at 0531. (Severt-KS)
5924.0	Russian Polytone (XPA), audio tone code with broadcast interference, Tuesday at 2020 Same XPA message, AM mode, broadcast interference again, Friday at 2020. (Mike L.-UK)
6501.0	NOJ-USCG Kodiak, AK, "Perfect Paul" voice weather at 0233. (Severt-KS)
6529.0	The Babbler-Possible Cuban military (V21), fast-talking Spanish at 1252. (Chris Smolinski-MD)
6532.0	SU0105-Aeroflot flight with HFDL position for Shannon, Ireland, at 0847. QR0019-Quatar Airways, HFDL position at 0857. VS0401-Virgin Atlantic, HFDL position at 0920. CO0021-Continental Airlines, position at 0923. AY1919-Finnair, position at 0924. (Privat-France)
6577.0	Air Transat 766-Airbus A333 from Montreal, Canada, getting altitude clearance from New York oceanic air control, enroute to the Dominican Republic, at 1750. (Larry Weiler-ONT, Canada)
6697.0	Dutch Boy-Unknown, possible US military, working Quiet Man at 2137. (Cleary-SC)
6754.0	CHR-Canadian Forces Trenton Military, Ontario, VOLMET with Canadian aviation weather at 0040. (Cyclops-TX)
6842.0	Russian Polytone (XPA), AM audio tone code, Tuesday and Friday at 2000. (Mike L.-UK)
6855.0	Cuban AM Spanish numbers (V2a), callup 88373 45893 66583, at 2100. (Cyclops-TX) V2a, callup 49482 95972 47302, at 2100. V2a, using a different "female" voice, callup 84062 82244 80857, at 2102. (Cam Castillo-Panama) [Old voice, being heard again. Seems to be an error or computer malfunction. Sometimes substitutes "grupo" for "tres." -Hugh]
6925.0	Unid-Probably US military, with over-the-horizon radar bursts preceded by 3 beeps, at 0250. (Severt-KS)
7361.5	T2Z82-US Army 2-82nd Aviation, NC, calling T5B159, 5-

- 159th Aviation, VA, ALE at 0851. (Cleary-SC)
- 7361.5 R23594-US Army or Army National Guard helicopter, ALE contact and then voice as "Tail Number 594," at 1441. (Metcalfe-KY)
- 7448.5 USADA1010-US Army, working USAPC1010, ALE at 1435. (Metcalfe-KY)
- 7527.0 Rescue 6010-USCG, working Panther (DEA Operations, Bahamas and Tortugas), on a rescue at 2132. (Cleary-SC)
- 7633.6 AFA1WP-US Air Force MARS, working C-130 King 34 at 1946. (Cleary-SC)
- 7887.0 Cuban AM Spanish numbers (V2a), callup 28693 06203 95863, at 2001. V2a, callup 32382 84052 65352, and next day 32383 84053 65353, both at 2001. (Castillo-Panama)
- 7975.0 Cuban AM Spanish numbers (V2a), callup 21041 92081 18811, early start at 1559. V2a, in progress next day at 1627. (Castillo-Panama) V2a, slow "female" voice and weak, at 1600. V2a, in progress at 1610. (Cyclops-TX)
- 8010.0 Cuban AM Spanish numbers (V2a), callup 21042 92082 18812, early start at 1655. (Castillo-Panama)
- 8023.0 KEY798-Probable EPA, calling several NPHRN stations in ALE, at 1642. 001CDCNHQ-US Centers for Disease Control, working several NPHRN stations in ALE, at 1702. (Metcalfe-KY)
- 8096.0 Cuban "cut" Morse numbers (M8a) in MCW mode, in progress at 1803. M8a, MCW callup 53993 43763 83043, at 1901. [Crypto people: note recurring position of "3." -Hugh] M8a, MCW in progress at 1912 and 1915. (Castillo-Panama)
- 8097.0 Cuban "cut" Morse numbers (M8a), in regular CW mode but badly breaking up, at 1810. (Castillo-Panama)
- 8190.0 CAGLIARI-Italian Financial Police, working OLTRAMONTI in ALE, at 1823. (Privat-France)
- 8382.5 UCQV-Russian vessel *Elektron*, working an unknown coastal station on 8422.5, in SITOR-A at an unknown time. (Privat-France)
- 8414.5 H8FC-Panama-registry container ship *MSC Pohlin* (MMSI 357405000), DSC safety test with USCG Miami, at 1226. 3FVS7-Panama tanker *Golden Elizabeth* (MMSI 351717000), DSC safety test with Miami at 1235. (Weiler-Canada)
- 8461.5 Unid-Possible UK Royal Navy, encrypted RTTY message at 1540. (Hall-RSA)
- 8764.0 NMN-USCG CAMSLANT, VA, high seas forecast simulcast on 8502, NMG, New Orleans, at 1540. NMC-USCG CAMSPAC Point Reyes, high seas forecast simulcast on 13089 and 17314, at 1633. (Cyclops-TX)
- 8788.0 WLO-Mobile Radio, AL, tropical weather and traffic list (no traffic), at 1400. WLO, voice weather, interference from a CW station, at 1500. (Cyclops-TX)
- 8806.0 WLO-Mobile Radio, AL, services and Hurricane Isaac advisory, then holding traffic for sloop *Escapade*, early at 0158. (Cyclops-TX)
- 8971.0 Wafer 22-US Navy P-3C, passing Spare Group to Golden Hawk, ME, at 1405. (Cleary-SC)
- 8983.0 Coast Guard Rescue 2112-USCG, working CAMSLANT and Sector Puerto Rico, regarding a distressed vessel, at 2302. (Allan Stern-FL)
- 9007.0 Canforce 3958-Canadian Forces CC-130, patch via Trenton Military to 435 Ops, at 2130. (Cleary-SC)
- 9022.0 Saber 21-Probable US Air Force, coded message to Alleycat at 1915. (Cleary-SC)
- 9025.0 REACH 403-US Air Force Air Mobility Command, patch via Croughton to McGuire AFB meteo, NJ, at 1955. (Cleary-SC)
- 9085.0 1221-Probable Italian Financial Police, working 1508 in ALE, at 1338. (Privat-France)
- 9122.5 MVD1-US Army Corps of Engineers, MS, calling MVP1, MN, ALE at 1920. (Cleary-SC)
- 9130.0 EZI2-Israeli Intelligence (E10), callup only at 1156. (Mike L.-UK)
- 10000.0 WWVH-US National Institute of Standards and Technology, HI, female time voice rarely heard in Texas, at 1305. (Cyclops-TX)
- 10202.0 WGY 9030-FEMA auxiliary station, TX, working state health department stations AUSTIN, ELPASO, and HOUSTON, ALE at 1805. (Metcalfe-KY)
- 10242.0 Coast Guard 1712-USCG HC-130, FL, position for CAMSLANT at 1259. (Cleary-SC)
- 10242.0 39C-DEA, working Panther at 2107. (Cleary-SC)
- 10320.0 Unid-Probably US Navy, with rebroadcast of Armed Forces Radio/TV Service interruptible voice channel, news at 0340. (Hugh Stegman-CA)
- 10780.0 Cape Radio-US Air Force, Cape Canaveral, FL, working King 1 for space shuttle range operations, at 1557. (Sevart-KS)
- 10956.0 Russian Polytone (XPA), long tone-coded message with a different sound, Friday at 0620. (Mike L.-UK)
- 11039.0 DDH-Pinnenberg Meteo, Germany, RTTY navigation warnings at 1725. (Hall-RSA)
- 11086.5 GYA-UK Royal Navy, Northwood, weather FAX at 1712. (Hall-RSA)
- 11175.0 Egg Plant-US military, patch via Offutt HF-GCS to Backbench, at 1907. Andrews-US Air Force HF-GCS, Andrews AFB, MD, moving Municipal to 11220.0, also at 1907. (Jeff Haverlah-TX) Doom 94-US Air Force B-52H, patch via HF-GCS to Red Ops, Barksdale AFB, LA, at 2138. (Cleary-SC)
- 11205.0 Evergreen 422-US Joint Task Force, working Smasher, FL, at 1530. (Cleary-SC)
- 11220.0 Municipal-US military, came from 11175 for Andrews, then sent data at 1920. (Haverlah-TX)
- 11226.0 Darkstar Papa-US Air Force E-3 AWACS, ALE-initiated voice patch to Charlie Flight, at 1533. (Cleary-SC)
- 11232.0 Otis 80-US Marine Corps KC-130, getting weather from Trenton Military at 1334. Sentry 05-US Air Force E-3 AWACS, patch via Trenton to Jazz Ops, New Orleans, LA, at 1810. (Cleary-SC)
- 11253.0 MVU-UK Royal Air Force VOLMET, West Drayton, female voice with aviation weather, at 2235. (Cyclops-TX)
- 11407.1 AFA1WP-US Air Force MARS, working HC-130 King 34, at 1946. (Cleary-SC)
- 11494.0 Coast Guard 1720-USCG HC-130, patch via Service Center to District 7 Ops at 1730. (Cleary-SC)
- 12156.0 Russian Polytone (XPA), short tuneup, Friday at 0640. (Mike L.-UK)
- 12575.7 354844000-MMSI of HOXX, Panama-registry bulk carrier *Elegant Star*, DSC safety test with Cyprus Radio, at 1039. 538001773-V7ED2, Marshall Islands bulk carrier *Irini*, DSC safety test and request for voice contact with Lyngby Radio, Denmark, at 1213. (Privat-France)
- 12579.0 NMF-USCG Boston, SITOR-B Hurricane Florence warning and marine safety information broadcast, at 1635. (Sevart-KS)
- 12602.5 SVO-Olympia Radio, Greece, parallel on 16830.5, CW markers at 1706. (Hall-RSA)
- 12745.5 JJC-Tokyo Radio, Japan, Japanese newspaper FAX (60/576) at 1709. (Hall-RSA)
- 12823.0 CTP-Portuguese Navy, Oeiras, RTTY markers at 1759. (Hall-RSA)
- 13321.0 ZS-SFJ-South African Airways 049, an A319, HFDL downlink for Johannesburg at 1355. D-ALCR-Lufthansa 8296, an MD-11, HFDL position for Johannesburg at 1356. (Hall-RSA)
- 13907.0 Coast Guard 1704-USCG HC-130, position for CAMSLANT at 1432. (Cleary-SC)
- 13927.1 Drago 61-US Air Force, patch via MARS station AFA6PF, at 1735. (Stern-FL) Bandsaw Kilo-US Air Force E-3 AWACS, patch via MARS stations AFA6AY and AFA4DD, at 2130. (Cleary-SC)
- 14389.1 Peach 32-US Air Force E-8 JSTARS, patch via MARS AFA3HS to Peachtree, (Robins AFB, GA), at 2059. (Cleary-SC)
- 14487.0 Lincolnshire Poacher-British M16/SIS, Cyprus (E3), female voice repeating callup 35962, then message in 5-figure groups, at 1300. E3, in progress under heavy noise, at 1422. (Cyclops-TX)
- 15658.0 494FEMAUX- FEMA auxiliary station WGY 9494, working FEMA WGY 9030, in ALE at 1811. (Metcalfe-KY)
- 15980.0 EZI2-Israeli Intelligence (E10), callup only at 1330. (Mike L.-UK)
- 16914.0 KSM-Maritime Radio Historical Society, Pt. Reyes, CA, new CW station with marker and weather at 2100. (Sevart-KS)
- 16986.0 CTP-Portuguese Navy, Oeiras, RTTY marker at 1130. (Hall-RSA)
- 17147.0 CBV-Playa Ancha/Valparaiso Radio, Chile, Chilean Navy weather FAX at 1120. (Hall-RSA)
- 18238.0 ZSJ-South African Navy, weather FAX, also on 7508 and 13538, at 1110. (Hall-RSA)
- 19414.5 Unid-Egyptian MFA, Cairo, Arabic traffic in ARQ at 0945. (Hall-RSA)

Over the Horizon Radar and ALE Networks

A couple of emails received this month reminded me to address the variety of noises that frequently come up as “odd digital sounds that can’t be identified.” These often turn out to be something called HF OTHR – Over The Horizon Radar.

❖ How does it work?

All *radar* (actually an acronym for RADio Detection And Ranging) works by sending radio energy out towards an object and hoping that some of that energy is reflected back. By measuring the amount of energy returned and the time taken between sending the outgoing energy and receiving the return, the range to the object can be determined. Since radio, like light, travels in straight lines, the further you want your radar to “see,” the higher off the ground your antenna needs to be. Getting beyond the horizon requires a substantial elevation.

Fortunately, our friendly ionosphere reflects HF radio waves over long distances and therefore offers an intriguing way to increase the distance over which our radar can work. Suffice to say, getting this all to work in order to detect small objects or features (usually ships, aircraft, missiles, etc.) requires big antenna arrays often miles long, lots of transmitter power and plenty of sophisticated electronics. Early experiments with OTHR began in the 1940s and continue to date.

The most (in)famous OTHR was probably the Russian system dubbed “The Woodpecker,” which operated from four locations in the Ukraine. As any shortwave listener and radio amateur active in the 1970s and 80s will tell you, this powerful and dreadful “tockatockatockatockatocka” moved indiscriminately around a wide swath of frequencies, destroying all communications including many important protected services. The Russians denied all knowledge for years until they finally switched off the system.

❖ Where are they now?

There are a number of OTHR systems operational at this time which are responsible for most of the signals heard by listeners:

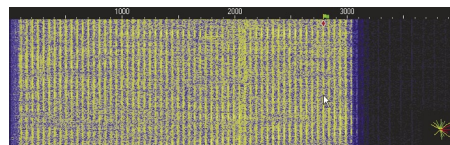
1. The Australian military operates the Jindalee (JORN) systems at Longreach, Laverton, Badu Island, and Alice Springs, which provide a look over that country’s north western approaches.
2. France’s Nostradamus system, operated by the state research & development organization ONERA, operates from just outside the town of Dreux.

3. The British also operate a number of HF OTHR systems from their numerous bases on the Mediterranean island of Cyprus.
4. Iran operates a system from an unknown location.
5. Spain has one at the US Naval base at Rota and another at Grenada.
5. China has an OTHR covering the South China Sea from an unknown location.
6. Both the US and Canada are known to operate a number of HF radar from various locations, including one looking out over the Caribbean Sea.

❖ What can I hear? Where should I tune?

All of these radar operate over quite large frequency ranges from about 5 to 30 MHz. In order to achieve maximum range, most operate close to the MUF (Maximum Usable Frequency), since that is the highest frequency at which a signal will be reflected back to earth, which means that you’ll need to consult a good source of propagation information to find what that frequency might be, given your time of listening and location of the particular OTHR. The British and French systems are very active and easy to hear from the US.

Most of the OTHRs are quite easy to identify as a raspy buzzing sound that extends over 10 to 40 kHz of bandwidth. Tune slowly through the band of frequencies used and the sound is always the same. The reason is that the OTHR signal is a set of precisely timed pulses. Looking at the signal using a spectrum analyzer shows this very quickly, as you can see in the example of the British OTHR on Cyprus.



This is also a way to distinguish between the various systems on the air today. For example, the French radar uses 40 Hz pulses and this British one uses 50 Hz. The OTHRs also vary in terms of bandwidth used. The Cyprus radar extends over some 20 kHz, for example, making it very easy to spot when tuning around. The most unusual is the Iranian radar that sounds like a slow clock ticking and can be found on 14000 and 21000 kHz. Note also, that unlike the quick bursts of an echo sounder (ionosonde), OTHRs tend to stay on frequency for 20 or 30 minutes or longer, before they change channels.

❖ Italian Finance Guard/ Customs ALE Network

These past few months have seen an upsurge in ALE activity from the Italian Finance Guard (Guardia di Finanza) ship network, which triggers Rohde & Schwarz high-speed modem activity. Most of the activity has been on 8190 kHz USB with the following units involved:

CAGLIARI
OLTRAMONTI
INUCCI
PARTIPIO
LASPINA
LOMBARDI
GARZONE

Other activity has been reported on 6600, 8072, 9085, 10440, 12175, 17970, 20546 and 25930 kHz LSB using 4 figure identifiers and Clover-2000 modems.

The GdF is a hybrid: part armed force, part police force of about 70,000 officers under the direct control of the Italian Minister of Finance and Economy. It operates sea patrols, anti-cyber-crime, counter-drug and other divisions.

❖ Uzbek Army ALE Network

One interesting ALE network with some very distinctive identifiers originates from Uzbekistan. Frequencies used are 4542.5, 5260, 5620, 6300, 6820, 7700 kHz. Identifiers to look out for are:

KAMAR99RS1006
MUROD02RS1006
OMEGA50RS1702P
OMEGA50RS704PR
RADAR92RS1006
SADAF23RS1702P
SADAF23RS704PR
SADAF11RS1702P
TUMOR02RS1006

Plain language is often sent between stations using AMD data messages.

RESOURCES

Australian OTHR - www.defence.gov.au/dmo/esd/jp2025/jp2025.cfm
Iranian OTHR Clip - www.iarums-r1.org/iarums/sound/Iran-Radar.wav
Woodpecker OTHR - www.iarums-r1.org/iarums/sound/14190rus.wav
GdF Website - www.gdf.it

Clearing Frequencies in 2007

Quick, if you are reading this before January 1, some stations are about to vanish from shortwave (unless there's a last-minute reprieve).

Radio Slovakia International was confirmed back on SW from Oct 29, first reported by Joe Hanlon, NJ, *DX Listening Digest*; including English as given last month, at 0100 on 9440 to SAm, and 7230 to NAm in the *HAM BAND!* No pretense here of serving Iceland, either, as this is registered for CIRA zones 7-10, i.e. Atlantic Canada, USA except western third, Mexico. How do they get away with this?

Feels like an old friend has returned," says Craig Krist, VA. 0100 was the same program as at 1930 on 7345, but 7230 has SSB QRM.

The return arrangement only lasts until the end of December, per their German mailbag heard by Markus Weidner, *A-DX* via Kai Ludwig. José Miguel Romero, Spain, a big fan of RSI who visited the station last summer, says the resumption is perverted, because it's only for two months. He heard some politicians say it was important, but not a word from the Director General, who had wanted it to close in favor of internet-only.

Resuming SW now is a macabre maneuver, since they no longer have the personnel to make daily shows at the previous level. In fact, new programs in Spanish are produced only three days a week, the rest being repeats. "My concern for RSI's survival has only increased. I hope I'm wrong and it will endure for many years, but a lot of things have to change. It's out of our hands and all we can do is express our support with messages to the station and reception reports."

Radio Prague faces no such obstacles, but its relays via Sackville and Miami are to expire at yearend. The new morning broadcast via Sackville at 14 on 15350 shifted in B-06 to 15 on 15160, still running one day later than other frequencies. Another one has been at 0400 on 5990. WRMI has been relaying Prague in English daily at 0900 on 9955, 1500 on 7385. The morning broadcast direct to NAm at 14 is on 13580 this B-06, not very well heard in Central NAm.

YLE Radio Finland, which terminated English broadcasts a few years ago, and even Latin last summer, plans to close down all its remaining SW services, mostly in Finnish and Swedish, after Dec. 31. Until then, NAm broadcasts are at 13-14 on 13715, 13-15 on 15400,

16-17 on 12000; SAm 11-12 21800, 16-17 17730.

From Iceland, **RÚV** will end SW relays of its main newscasts by the end of the year, reveals Bernd Trutenau, Lithuania, in *DXLD*. Since the 1970s, RÚV had leased SW capacities at the Gufunes Telecommunications Centre in Reykjavík to serve Icelandic ships and expatriates in Europe and North America. Catch it now or never on USB plus reduced carrier. To Eu: 1215-1300 on 13865, 1755-1825 on 12115; to NAm: 1410-1440 & 1835-1905 on 13865, 2300-2335 on 12115. The times vary somewhat, says Mark Schiefelbein, MO in the *NASWA Flashsheet*.

Looking further ahead, prospects are bleak for SW as we have known it from France and Italy. **RFI** listener Mike Cooper also keeps up with press about the situation there. A series of 24-hour and longer strikes hit RFI in November, as unionized staff objected to budget restrictions at RFI while a *France 24* TV channel was being launched. Languages on radio were to be "repositioned."

Labor unions say RFI is being isolated and marginalized. The Foreign Affairs ministry wants RFI to concentrate on Africa, the Middle East and emerging countries. During the strikes, RFI Musique was heard instead of regular programming, including English. RFI posted a notice in which Francis Ayrault called SW "the most expensive transmission method and one that is only used when there is no other choice."

The Italian government apparently plans to ask **RAI International** to abandon (or radically reduce) its SW radio transmissions in 2007 and to reinvest the 18 million euros in a better way, ending news in 26 languages. News will be delivered in just five languages: Spanish, French, English, German and Arabic, via satellite or, for a while, SW. Around 80 mother-tongue translators and newscasters will be given other jobs within the company. This is according to *Il Velino* via Roberto Scaglione, and Andrea Lawendel.

Lawendel also quotes Andrea Borgnino, who works for Rai: "unfortunately, and very sadly, true; here in Rai's Rome HQ you can hear voices about shortwave's imminent demise in every corridor." Monitor George Poppin heard from Mario Ballabio, RaiWay Monitoring Centre, Monza, "At the moment [late Oct] Rai International is going to continue with SW transmission."

AFGHANISTAN [non] R. Solh on new 15095 at 12-15 (Wolfgang Büschel, Portugal, *DXLD*) It's on 15265 as usual in B-season, where we enjoy the music, from Rampisham UK, but another transmitter there has BBC in Arabic on 15180 halfway between, landing this leapfrog mixing product on 15095 (gh)

BHUTAN BBS with nonstop monk choir on 6035, two nights at 0005-0015 (Giampiero Bernardini, North Italy, *HCDX*) Also heard with prayers at 0022 (Guido Schotmans, Denmark, *BDX*) Used to sign on at 0100. Earlier start should be propagationally useful westward, and possibly of help by grayline to NAm, if the frequency is clear. On 6035 only Colombia is listed, but it's a tight squeeze between Marti/jamming 6030, China/Canada 6040 (gh)

BOLIVIA R. San Miguel, Riberalta, varying 4937.14 to 4937.04, at 2245-2359 in Spanish, with soccer match, pop music, ID, better in LSB (Nicolás Eramo, Argentina, *DXLD*) Nine days later in the morning it was on 4936.83 at 0944-1008 with animal sound effects, campesino song, adstring, 1008 nice canned ID (Dave Valko, PA, *HCDX*) Jumps around; WRTH 2006 showed it on 4904 (gh)

BURKINA FASO RTB was heard in late Oct on 5030 at 2105 in French; no signal when checked a few minutes earlier (José Miguel Romero, Spain, *DXLD*) And in early Nov on 5030 at 2230 in French mixing with a Chinese (Dave Kenny, UK, *BDXC-UK*) Also heard on 7230 Sunday at 0818 in vernacular, religious chorus (Wolfgang Büschel, Portugal, *DXLD*)

CANADA Correlating with CHU having to move off the 7 MHz band, RCI Sackville was heard testing on very strong 7310 for a few days in late October around 1601-

1636 in French, // 17765 (Bernie O'Shea, Ottawa, *DXLD*) A first, Sackville on the 7 MHz band, which they have never used even for relays of other stations. Very weak here, but probably hoped not to be noticed abroad (gh) See also CUBA [non]

Although there's nothing left to hear on RCI during these hours but *The Link*, *Blink* or the mailbag, the 18-19 broadcast to Africa is now on three Sackville frequencies, 13650, 15365 and 17740, so these should provide good coverage to much of NAm off the back; likewise 21-22 to Europe on 9770 (gh) *The Link* is now taking up 100% of our resources (Marc Montgomery, RCI host, *DXLD*)

Maple Leaf Mailbag occupies the 1400 UT hour Sundays on 9515, 13655, 17820, reducing CBC's *Sunday Edition* to only two hours, but its first hour is still broadcast at 1511. Hour 1 is still on CBCNQ 9625 at 1411. Weekdays, the 14-17 transmission has two hours of *The Link*, and then the first hour only of CBC's *Sounds Like Canada*. By luck of the draw, the hilarious *Dead Dog in the City* remains on SW, Thursdays at 1644, but the Friday features during SLC's final half hour do not (gh)

Several operational mistakes marred the first few days of the B-06 season. R. Sweden relay in English at 1430 on 15240 instead contained CBC NQ in Inuktitut // 9625; R. Prague relay at 1500 on 15160 started late or switched inexplicably to CRI in Chinese (gh)

CENTRAL AFRICAN REPUBLIC R. Centrafricaine, 7220, news in French & vernacular, frequency clear after RL closes at 0600; Bangui sometimes opens later around 0617, fading by 0645. RFI is listed here in Hausa, but not heard (Martien Groot, Netherlands, *DXLD*)

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; B-06=winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

CHILE Another harmonic to look for on 19 MHz band besides Gabon 19160: CVC on 19270, 2 x 9635. Adan Mur reported to *Conexión Digital* it was booming into Paraguay at 1854; 9635 scheduled 12-24 in Spanish on 30 degree beam (gh)

CHINA [non] CRI B-06 English to Americas, with sites added by gh (Albania, Canada, Chile, Cuba, Spain):

2300-2400	5990Cu 6040Ca 11970Ca
0000-0200	6020A 9570A
0100-0200	9580Cu 6005Ca 6080Ca-DRM
0300-0400	9690S 9790Cu 6190Ca
0400-0500	6190Ca
0500-0600	6190Ca 5960Ca
0600-0700	6115Ca
1100-1200	5960Ca
1300-1400	9570Cu 11885Ca 15230Ca 15540Ch
1400-1500	13740Cu 13675Ca 15230Ca
1500-1600	13740Cu

(CRI via Mark Schiefelbein, DXLD)

CONGO DR R. Kahuzi heard October 29 as late as 2200 on 6209.66. In an e-mail QSL they told me that they will be running overtime also the next day (Gert Nilsson, Sweden, *dxing.info*) But not heard the next day (Jari Savolainen, Finland, DXLD) Watch out for a repeat, especially after Greek mix on 6210 is done at 2000 (gh)

CROATIA [non] HRT, Hrvatska Radio Televizija via DTK Germany B-06: 23-04 SAm, 00-04 ENAm, 02-06 WNA all on 7285, the first two from Wertachtal, the last from Nauen. 05-08 NZ 9470, 06-10 Au 11690 (via Kai Ludwig, DXLD) That means three transmitters at once at 0200-0400, let us hope now with audio synchronized; includes segments in English and Spanish, but when? Wertachtal is to be closed at yearend; then what? BTW, 9470 to NZ is on exactly same azimuth, 240, as first transmission on 7285 to SAm – in the hamband! (gh)

CUBA RHC B-06 English: 2030-2130 UT 9505 11760 kHz; 23-24 9550; 01-07 6000 6060 6180; 05-07 9550 11760 (Arnie Coro, via José Miguel Romero, Noticias DX) 6180 replaced 9820 for winter, and ran only until 05 at first (gh)

[non] Even before next April, CHU was about to get blasted away on 7335, as Cuban clandestine R. República, which was on 5910 for A-06, picked 7335 for B-06, M-F at 23-04. Cuban jamming attacks it wherever it goes. The transmitter operator, DTK in Germany, thought it had to leave 5910 because Ukraine was registered there. But Ukraine was really on 5820 instead, and RR did not need to move. We headed off their move to CHU's frequency, and RR wound up on 5970, which happens to be right next to RHC on 5965.

Then R. República was adding yet another broadcast from Nov 14, UT Tue-Sat 0200-0500 on 9630 via Sackville. That plus jamming is bad news for CBC Northern Quebec service on 9625 from the same site; two transmissions only 5 kHz apart are usually avoided (gh)

A new exile program on WRMI, *Cuba Virtual*, 02-03 UT Sunday on 9955. See <http://www.cubavirtual.org> (Jeff White, DXLD)

EGYPT R. Cairo B-06 English: SAs 1215-1330 17835, C&Saf 1600-1800 11740, Waf 1900-2030 15375, Eu 2115-2245 9990, ENAm 2300-2430 11885, NAm 0200-0330 7270 (via Tarek Zeidan, Egypt, DXLD) Like last winter, 11885 collides with WYFR in Portuguese, but with plenty of signal off the back, effectively blocking Cairo in much of NAm. I assume Cairo still isn't participating in HFCC, allowing everyone else to pretend it is not on the frequencies it is on (gh)

FRANCE RFI posted totally wrong and outdated info on its website, so with the help of Wolfgang Büschel, Joe Hanlon, Alokesh Gupta, Dave Kenny, and Ron Howard, we cobble together a more correct but not completely confirmed B-06 English schedule. () means replacement frequency from Feb. 25. From Issoudun, France site, u.o.s. The first three may still be M-F only:

0400-0430	7270-Ascension, 7315, 9805
0500-0530	9805 (13680), 11995
0600-0630	7315, 9865-Asc, 11995 (15160 9765), 13680, 17770-Rwanda
0700-0800	11725 (15605)
1200-1230	15275-Asc, 21620
1400-1500	5920-Chita, Russia
1600-1700	9730 & 15160-S Africa, 11615 (15605) (gh)

GREECE Since we know two Avlis transmitters produce a mixing product on 6210 (15630 minus 9420; see CONGO DR) we ought to go looking for other possibilities, for example: 17525 minus 9425 = 8105 at 1100-1550; 12105 minus 7475 = 4630 at 2300-0650 (gh)

VOG's two weekly English shows: *Hellenes Around the World* airs Sat 14-15 on 17525, 9420, no longer intended for NAm, though many of the guests are from here. *It's All Greek to Me*, music lately with nothing but an opening announcement in English, Sun 1105-1200 on 17525, 9420; UT Mon 0030-0130 on 7475, 9420 (via John Babbis, MD, Mike Barraclough and Sean Gilbert, UK, DXLD) 3-minute English news from the Macedonian station, 9935, heard at 1257 (Erik Koie, Denmark, *ibid.*) Second harmonic 19870 has also been audible later (Jürgen Lohuis, Germany, *harmonics* yg)

INDIA After a one-year delay, AIR finally moved its four 90m regional stations to 60m at the beginning of B-06:

4810, Bhopal, 50 kW 0025-0215, 1130-1742 (ex 3315)
4835, Gangtok, 10 kW 0100-0400, 1000-1600 (Sun 1615) (ex 3390)
4965, Shimla, 50 kW 0025-0215, 1300-1730 (Sat, Sun 1741) (ex 3223)
5015, Delhi, 50 kW 1220-1840 (ex 3365)

(Jose Jacob, Kerala, *dx_india*)
Checked at 1330/1400, 4810, Bhopal weak under Armenia; 4835, Gangtok weakish on clear channel; 4965, Shimla under VOR; 5015, Delhi mixing with Turkmenistan (Jari Savolainen, Finland, DXLD)

Complete B-06 SW schedules of All India Radio (Home & External Service) in frequency order: www.qsl.net/vu2jos/sw/freq.htm

And AIR's official B-06 schedules are here: www.allindiaradio.gov.in/schedule/fqsch.html (Jose Jacob, Nov 2, *dx_india*)

INDONESIA Reactivated RRI-Biak on 4920 at +0830 to 1015, knocked out Lhasa. First noted Nov 4, Jayapura News at 0930 // Serui 4605 (A. Ishida, NDXC-HQ, Japan, DXLD)

IRAN IRIB B-06 English: 1030-1127 15460 17660; 1530-1627 6160 7330; 1930-2027 6010 6250-Lithuania 7320 9855 11695; 0130-0227 6120 7160 "Voice of Justice" to NAm (via Swopan Chakraborty, India, DXLD)

Plans to start DRM at 1500-2057 on 7410, 2100-0457 on 7440 (DX Mix News, Bulgaria) Direct? Analog Lithuanian relay 6250 is at 259 degrees (Bernd Trutenau, DXLD) 6250 a bad choice, colliding with Pyongyang (Sergey Nikishin, Russia, DXLD) Hey, Axis of Evil vs. Axis of Evil! (gh)

IRELAND [non] RTE, by a fluke of scheduling, is once again on SW without putting out any effort to make it so. M-F at 13-16, WRMI relays WRN on 7385, including RTE at 14-15, after RN, before Prague and Sweden. This is just fill until and unless the time can be sold (gh)

ISRAEL Kol Israel B-06 English updated, to NAm/WEu u.o.s.: 0430-0445 6280 7545 17600-CAM/Au; 1030-1045 15760 17535; 1830-1845 6985 7545 9345; 2000-2025 6280 7545 15640-Saf. From March 1, 9345 replaces 6280.

Hebrew: 05-06 7545, 06-1030 & 1130-13 15760, 13-15 13630, 19-20 & 21-0430 7545; 21-2215 11585-SAM/Spain (via Doni Rosenzweig, DXLD)

KOREA NORTH VOK's B-06 English schedule per monitoring (certain transmissions also on feeders 3560 or 4405):

0100	NEAs 7140 9345 9730
	C&SAm 11735 13760 15180
0200	SEAs 13650 15100
0300	NEAs 7140 9345 9730
1000	C&SAm 6285 9325
	SAs 6185 9850
1300	WEu 7570 12015
	NAm 9335 11710
1500	WEu 7570 12015
	NAm 9335 11710
1600	ME/NAF 9990 11545
1800	WEu 7570 12015
1900	Saf 7100 11910
	ME/NAF 9975 11535
2100	WEu 7570 12015

(Arnulf Piontek, Germany, DXLD)

[non] Shiokeaze (Sea Breeze), about abducted Japanese, B-06 schedule changed to: Shiokeaze 1 in Japanese, 2030-2100 on 9645; Shiokeaze 2, alternating Japanese, Korean, Chinese, English at 1300-1330 moved from 9485 to 9730 but collided with China, shortly later moved again to 9950 (Ron Howard, CA, DXLD) Unusable here with WEWN supersignal on 9955 (gh, OK)

KURDISTAN [non] TDP schedule shows a new one in B-06, Denge Rojhelat, 1700-1900 on 7590 AM daily in Farsi to ME (via Eric Zhou, China, DXLD) Denge indicates it's in Kurdish, not Farsi (gh) Denge Mezopotamya on 7590 until 1655, but nothing heard from this (Mike Barraclough, UK, DXLD)

LAOS [non] Hmong Lao Radio shifted one UT hour later on WHRI 11785, Sun & Sat 1400 on 11785 (gh)

LATVIA Raimonds Kreicbergs, now the sole, personal license owner for relays from Ulbroka site on 9290, writes that his SW relay services will resume in near future. In addition to the 100 kW unit, a new 1 kW SW transmitter has been installed, offering a new option of low budget relays. It will use the same antenna as the 100 kW (Bernd Trutenau, Lithuania, DXLD)

MALAYSIA RTM B06 shows some channels which are really inactive, but two sites on 6050 at same time: Kajang, near Kuala Lumpur at 02-17 with 50 kW, and Sibau, East Malaysia, 02-15 with 10 kW (via Swopan Chakraborty, India, DXLD) Kajang seems to be the one off-frequency to the low side; now also with co-channel China at 14 (gh)

MOLDOVA On new 6235, R. DMR, heard in English at *1700-1720 (Kouji Hashimoto, and Iwao Nagatani, Japan, *Japan Premium*) Very good signal in UK (Mike Barraclough, DXLD) If this is really running a megawatt, it should be an interesting challenge to DX at local noon in ENAm around solstice. At least this frequency should be clear of broadcast QRM (gh)

MONGOLIA [and non] During B06 P'yongyang uses 12015 to WEu killing the Voice of Mongolia in English at 1500 and 2000 (Henrik Klemetz, Sweden, DXLD) So be sure which one you hear here (gh)

NETHERLANDS [non] Besides Bonaire relays to NAm, RN can be heard surprisingly well in CNAm on 12080 via Madagascar to SAs in English at 1400-1557; and try 15595. Also, African service at 1900-2100 daily on Bonaire 17810, Madagascar 11655 (gh, OK)

NEW ZEALAND RNZI changed its B-06 schedule only a week after the season began. It's probably been revised a few more times by now, but as of Nov 8, on AM: From 0559 9870, 1059 13840, 1259 5950, 1751 9870, 1851 11675, 1951 17675, 2151-0558 15720. For the latest, plus DRM, see www.rnzi.com/pages/listen.php (gh)

PAKISTAN PBC B-06 in English: 0730-0830 WEu 15100 17835 [and probably also 1100-1104]; 1600-1615 ME/NWaf 6215 7530, SEaf 11570 (via Alokesh Gupta, DXLD)

PAPUA NEW GUINEA Wantok Radio Light urgently needs a solid security fence around its site in a rough neighborhood. Application for frequency change from 7120 to 7325 was filed with PNG Telecomm authorities in Nov 2005, but no reply as of June 2006; application for a second [lower] frequency to improve nighttime coverage was submitted in July. All these SW projects should be completed by the end of 2008. DX reports from around the world have caused great excitement (*Progress Report for 2005-2006*, WRL via DXLD) If WRL starting using 7325 now in B-06, during nighttime hours it would collide

with China, Taiwan, India, Cyprus, at least (gh)

POLAND [non] New R. Polonia relay via Germany on first day of B-06 was gangbusters! at 1300 on 9525; there is a mailbag in the second half hour on Sundays. No QRM from Indonesia audible here (Joe Hanlon, NJ, Kraig Krist, VA, DXLD)

Others in ENAM report varying amounts of QRM. Only Indonesia audible here! R. Polonia's new relay via French Guiana, 40 degrees back to Europe in Polish at 22-23, collides with BBC via WHRI to Caribbean at same hour on same frequency, 9660! BBC was on 13765 during A-06, and it seems the only reason they picked 9660 was that they are also using it from WHRI in the mornings. A better reason was needed. Was there no coordination between these two, or did they figure there would be no problem, since one is to Caribbean and the other to Europe? BBCWS atop RP here, but annoying and totally unnecessary QRM underneath. Collision bound to be even worse in the Caribbean target area of BBC. And Stephen Luce in Houston tells me they were about equal strength there. In the previous hour, however, 9660 is in the clear for BBC. Will one have moved by now? (gh)

PORTUGAL RDPI still broadcasts to NAM at 300 degrees, but only in Portuguese; when not covering sports, a good source for music, B-06. M-F: 13-17 15560, 17-19 17825, 19-24 15540 (all optional for special events); Tue-Sat 00-03 9455; Sat & Sun 13-17 15560, 17-19 17825, 19-21 15540, and optional 21-24 15540. These are 300 kW transmitters but run at 100 kW due to antenna restrictions (via Carlos Gonçalves, Portugal, DXLD) From its favorable location in SW Europe, many other broadcasts to Europe, Africa and South America can also be heard (gh)

SAINT HELENA R. Saint Helena was heard testing 11092.5-USB between 1504 and 1649 UT on Oct 30, several days before the official revival (Jari Savolainen, Finland, Roberto Scaglione and Francesco Cecconi, Italy, Dietmar Birkhahn, Germany, DXLD)

R. Saint Helena Day, Nov 4, was a resounding success, from before 1800 to past 0100 UT Nov 5, with reports from all over the world packing the DX lists, e-mail and some phone calls direct to the station, acknowledged on air. Reception was not so good in South America, little was reported from Africa, and those who tried in most of Australia and New Zealand were unsuccessful, but a few in the northern parts with quiet locations pulled it in.

The final sesquihour was to be aimed at NAM, but when the antenna was turned at 2330, signals bounced back from a nearby MW tower and caused some oscillation, so the beam had to be backed off to 345 degrees. Still, it was well heard in most of NAM. Station said it had received some 300 e-mails during the test.

Now with equipment installed and used successfully, what's the point of doing only one broadcast a year? They might as well run 11092.5 every weekend, or every evening, only duplicating local RSH programming. This need not detract from an annual special, à la Radio RSA's New Year Eve call-ins. RSH might be more amenable to frequent broadcasts if an external QSL manager would take that workload off. It was a real treat to hear Radio Saint Helena again, and thanks to everyone who made it possible (Glenn Hauser, WORLD OF RADIO)

SÉNÉGAL [non] West Africa Democracy Radio heard on 12000 at 0733-0800* in English (Kouji Hashimoto, Japan, *Japan Premium*) Which means we in NAM again have a chance to hear it since they have moved down from 17 MHz in the middle of our night. This is 500 kW due south from Rampisham UK at 07-08; Ascension would be even better. At 08-11 it should be on 17860, 300 kW due south from Skelton (gh)

SERBIA [non] International Radio Serbia was to resume SW from Nov 6 per new schedule on website, all via Bijeljina-Jabanusa, Bosnia, non-directional at 1730-2200 on 6100, including English 1930-2000 (Dragan Lekic, Serbia, DXLD) First day with startup problems, nothing heard but interval signal at 2059 (JM Aubier, France, *ibid.*) Nothing but China on 6100, and DRM from Luxembourg 6090-6100 (Kai Ludwig, Germany, *ibid.*) Next few days, heard the SW frequency announced on the webcasts. Then audible at 2022 by tuning to 6102, but heavy QRM (José Miguel Romero, Spain, *ibid.*) 2140 gaining in French vs CRI, clear after CRI closed at 2157 (Mike Barraclough, UK, *ibid.*)

6100 is a traditional frequency for Serbia under whatever name going back sesquidecades well before the Bijeljina site was built; and IRS is probably not disposed to change it, no matter what the QRM (gh)

IRS had to stop broadcasting on FM in Belgrade, not awarded a license. Will continue in 12 languages on SW and internet (Branko Pekic, *Media Network blog*) So SW substitutes for FM? What a switch (gh)

SOUTH AFRICA Channel Africa B-06 English: 0300-0355 7390, 0300-0459 3345, 0500-0555 9685 [this one to Waf is well heard in Nam], 0500-0659 7240, 0600-0655 15255, 1000-1200 & 1400-1559 9620, 1500-1555 17770, 1700-1755 15235, 2000-2200 3345 (via José Miguel Romero2, DXLD)

Our only chance to hear Afrikaans on SW is Radio Sonder Grense, successor to the old Springbok Radio, to fill in FM coverage gaps in the Northern Cape. 7185 comes in best in CNAM, and we found Afrikaans not as much like Dutch as we had thought; B-06: 0500-0700 7185, 0700-1700 9650, 1700-0500 3320 (SENTECH via Swopan Chakroborty, DXLD)

THAILAND R. Thailand B-06 English, Udon u.o.s.: 0000-0030 Saf 9680, 0030-0100 NAM 5890 Greenville, 0300-0330 5890 Delano, 0530-0600 Eu 13770, 1230-1300 Au 9810, 1400-1430 Au 9725, 1900-2000 Eu 9805, 2030-2045 Eu 9535. 9725 occasionally audible in NAM when Costa Rica is off (gh)

TURKEY VOT on 17700 in German produces a lot of spurs, totally distorted, 1230-1327 17645, 17675-17696, and 17755, 17780, and 17706-17727 (Wolfgang Büschel, Portugal, DXLD) Heard VOT in Turkish sports on 20050 at 1303-1324* with another program in background, // 15350 (Juergen Lohuis,

Germany, *harmonics* yg) Leapfrog mixing product with 17700 which is in German at 1230-1325, while 15350 is in Turkish, 2350 kHz apart (gh)

Another such mixture was on 21140 in the hamband, 9560 leapfrog over 15350 at 0930-1030 only; TRT was notified, replies received from Sedef Somaltn and Kymet Erdal [who BTW are both women] of TRT frequency management, adjustments were made at the Emirler site and the spur disappeared (Uli, DJ9KR, Bihlmayer, DARC-Monitoring System Intruder Watch)

VOT's English at 1330-1425 for B06 on 11735 eastward to Asia and 12035 NW to Eu and incidentally NAM, nevertheless had a stronger, steadier signal here on 11735, including *Live from Turkey* on Thursdays; were the facilities swapped, or is long-path propagating better than short-path? However, WYFR bothers from 11740 while 12035 is clear. Like above, we should also look for leapfrogs on 11435, 12335 (gh, OK)

UKRAINE RUI had to move from 5840 to 5830 at 21-01, including English at 22, due to Sweden on 5840 (Alexander Yehorov, Kyiv, RUI via Sergei Nikishin, Russia, WORLD OF RADIO) He also mentioned that home service UR-1 program is now on 5970, 100 kW non-directional from Brovary site near Kyiv, no time given. And private 250-watt Radio Dniprovskaya Hvylya (The Waves of Dnepr) on 11980 operates Sat-Sun 0700-0900. Located at Zaporizhzhya and has been relaying UR-1 apart from own programs (Ullmar Qvick, Sweden, DXLD)

UK [non] I have enjoyed catching the chimes of Big Ben at New Year's on 5975 at 0000 GMT on the BBC for the past couple of years. With the BBC's current nonsense, will I be able to catch this event this year via shortwave? I am not able to listen via the internet (Brad Stephens, TX, DXLD)

Studying the BBCWS B-06 schedule, these are the options, none intended for us. The only frequencies running through 0000 are 11955 via Thailand (however, switching antennas then), 11945 Japan, 9740 and 6195 Singapore. Several more start or end at 0000, but don't depend on them for this: Until 2400: 5965, 5985 Thailand, 6170 Korea; from 0000: 17615, 15285 Thailand, 15360 Singapore, 9605, 5970 Oman (gh)

VT Communications (VTC) was recently awarded a contract to broadcast SW programs for Deutsche Welle. To accomplish this, more equipment is being added at UK stations. A new 250 kW SW transmitter at Woofferton started in mid-October, made by Riz in Croatia. Two more from Zagreb will follow by early 2007, one at Woofferton and the other at Skelton (VTC *Bulletin* via Mike Barraclough, DXLD) Not enough DRM capacity yet, so VT may rent time back in Germany for DW! (Kai Ludwig, DXLD)

USA VOA Director David Jackson resigned in late October. His tenure was marked by numerous run-ins with members of VOA's professional journalist staff, who accused him of slanting the VOA and its radio and newer television programming and Internet website sharply toward Bush administration policies (VOA sources) Replaced by former *Wall Street Journal* and *Ottaway Newspapers* executive Danforth W. Austin. The Board also announced appointment of Russell Hodge as new director of VOA Television. Hodge is President of 3 Roads Communications, an Emmy-award winner who has produced programming for HBO, PBS, CNBC – including the John McLaughlin show – and Fox, where he was responsible for putting current White House Spokesman Tony Snow on the air. He is also reported to be an associate of BGG member Blanquita Cullum (Save America's Voice blog)

Although Delano is much further from Washington than Greenville, program feeds get to Delano first via T-1 telcom instead of satellite link still used by Greenville, so when they are carrying the same program, such as R. Marti, the delayed one is Greenville (via John Vodenik, IBB Delano, DXLD)

The FCC B-06 schedule has entries for non-existent KTLI in Oregon, which has a CP, but no word as to whether it is actually under construction, all 50 kW, with azimuths and targets:

9820 0700-1100 309 Kamchatka

9845 0200-0400 130 Mexico

11570 0100-0500 70 Central Canada (gh)

KAL near Dallas is awakening from its slumber; after trying 9975 and 9895, it began using new 9340 at 13-24, with various political and religious talkshows, along with 5755 from 00 to 06 or later, and wanted reports to evaluate coverage. The only functional antenna is aimed NW, 2-bay TCI with 14 dB gain, but fairly high takeoff angle, and broad beam of some 68 degrees also with significant side lobes (gh)

KOA Denver, 25950 NBFM at 1940-1956 fade out, on a Saturday with football game, ads, ID, fair to good on peaks (Rich D'Angelo, PA, NASWA *Flashsheet*)

KSL Salt Lake broadcast aux on 26190 NBFM at 1844 with talk, not identified till the next day at 1755 with *Cultural Connections* program (Terry L Krueger, FL, DXLD)

Very little activity on 11m now; only two logs in 2006:

26350 NBFM, WAND (Ch 17) Decatur IL, at 2305 in June, *News Center* 17.

26410 NBFM, WNOX (100.3 MHz) Knoxville TN, at 1410 in August, "Knoxville's big talker FM 100" and "100.3 WNOX" (Alan Roberts, QC, 25 *Plus*, CIDX Messenger)

Another phone portal through which one can hear *World of Radio* is UPSNAP. Call 646-213-0005 and enter program number 2679 (Tim Hendel, AL, DXLD)

ZAMBIA ZNBC, 5915, heard from 1545 in great greyline opening to Oahu, arm-chair signal in the clear at 1712, past 1800 news, nothing in English; nothing on 4910 or from neighboring countries (David Norcross, Windward Oahu, HI, WORLD OF RADIO) That's close to antipodal (gh)

ZIMBABWE [non] V. of the People, via RN Madagascar, B-06 at 1659-1757, on new 11695, 265 degrees, 50 kw (via gh)

Until the Next, Best of DX and 73 de Glenn!

BROADCAST LOGS

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn, W4GVH

gaylevanhorn@monitoringtimes.com

http://mt-shortwave.blogspot.com

0015 UTC on 7345

CZECH REP: Radio Prague. *Czechs in History* program // 9440 poor signal quality. (Bob Fraser, Belfast, ME)

0050 UTC on 5890

THAILAND: Radio Thailand. Editorial on job market in Thailand to national weather update. Text on women's equality and Thai music on 9695 at 0058. (Howard Moser, Lincolnshire, IL) **VOA relay** 13755, 2308 *New Dynamic* program; **BBC WS relay** 15280, 0040. (Stewart MacKenzie WDX6AA, Huntington Beach, CA)

0110 UTC on 9665

RUSSIA: Voice of Russia. News on Castro and plans of summit. (Moser, IL) *Russian by Radio* 11980, 2040 // 9890. (Fraser, ME) **VOR** via Moldova 9665, 0247. (MacKenzie, CA); Moldova 9665, 0401. (Joe Wood, Greenback, TN) Russia's **Kamchatka Rybatskaya** 11975, 0002-0059. Russian mentions of "Kamchatka" to techno-pop music. More tunes from ABBA to closing announcements at 0059 with S9+30 signal. (John Wilkins, Wheat Ridge, CO)

0139 UTC on 6010

CANADA: Radio Sweden relay. Newscast to world economic rankings. (Moser, IL) 15240, 1422 item on Sweden's first astronaut. (Fraser, ME)

0237 UTC on 9795

HUNGARY: Radio Budapest. *This Week in Budapest* feature with SIO 353*. (Harold Frodge, Midland, MI; Moser, IL)

0240 UTC on 7460

CLANDESTINE: Radio Payam-e Doost. Farsi. Extended talk and announcement by female with SINPO 24432. (Arnaldo Slaen, Buenos Aires, Argentina)

0259 UTC on 7270

TURKEY: Voice of. Turkish music program audible after Radio Cairo's sign-off. (Moser, IL) *Turkish by Radio* 9830, 2245. (Fraser, ME) 5975, 7270, 0329 with VOT news. (Frodge, MI)

0335 UTC on 4845

MAURITANIA: Radio Mauritanie. French/Arabic. Heard frequently with apparent religious talk and occasional brief Koran recitations. Brief announcements at 0400 with good signal. (Jim Evans, Germantown, TN) 4845, 0426. (Wood, TN)

0405 UTC on 9860

VATICAN CITY: Voice of Russia relay. Talks about North Korea's nuclear testing, followed by items on Moldova and Ukraine. Sports roundup with fair signal quality. (Wood, TN)

0416 UTC on 4990

SURINAME: Radio Apinite (presumed). Pop music to Dutch announcements by male/female duo. Very poor signal quality with SINPO 24222 at best. (Evans, TN) logged 4990, 0642-0712. (Wood, TN) 4990, 0031-0102. (Scott Barbour, Intervale, NH)

0508 UTC on 9720

PERU: Radio Victoria. Spanish. Religious programming with fair signal quality. (Wood, TN) Peruvians monitored: **Radio Nacional de Huanunu** 5967.52, 1015. (Slaen, ARG) **Radio Ancash** 4990.93, 0914-0940; **Radio Maranon** 4835.47, 0955-0957; **Radio Madre de Dios** 4936.64, 1006; **Radio Libertad de Junin** (presumed) 5039.2, 1101. (Dave Valko, PA/Cumbre DX) **Radio Altura** 5014.13, 0335-0340. (Slaen, ARG)

0554 UTC on 6060

CUBA: Radio Havana Cuba. *Weekly Review* with Ed Newman on medical treatments in the Gaza region of the Middle East. (Wood, TN; Moser, IL)

0944 UTC on 4936.83

BOLIVIA: Radio San Miguel. Male/female host with Spanish canned ads and nice campesino music. Intro music and possible mention of "madre de Dios" for intro program. Announcer began with time check, nice canned ID at 1008 for fair-good signal. (Valko, PA)

0956 UTC on 5910

COLOMBIA: Maril Estereo. Spanish devotional program at tune-in. Musical tunes to ID amid poor signal quality. (Barbour, NH) 1019-1032+. SIO 333. (Frodge, MI)

1000 UTC on 5040

ECUADOR: La Voz del Upano. Spanish. National anthem to usual canned ID "Radio Difusoras Catolica Cultural, La Voz del Upano."

Location, freq/power and phone number given followed by morning comments to listeners and presumed PSA. Good signal. (G. Van Horn NC) 3280, 0546. (Wood, TN) **HCB** 6050, 0418. (Wood, TN)

1137 UTC on 3985

CLANDESTINE: (North Korea) Echo of Hope (presumed). Techno pops to lady announcer into talk at 1145. Jammer present and more effective on LSB than USB. No jamming noted on //6348. **Hmong Lao Radio via WHRI** 11785, 1314-1359* Presumed Hmong language with talks, musical bridges and woodwind instrumentals. Mentions of "St. Paul" and "Minnesota." Mostly vocal music to 1359 closedown and WHRI identification. (Wilkins, CO)

1228 UTC on 4810

MEXIO: XERTA/Radio Transcontinental. Spanish. Vocal music to IDs including address at 1232 and 1246. Fair signal but only partially readable through band noise. (Wilkins, CO)

1303 UTC on 4789.98

INDONESIA: RRI Fak-Fak. Arabic/Indonesian. Koran program to Jakarta network relay items. Vocal music to closing announcement over Love Ambon music to 1401*. Good signal with CODAR interference. **RRI Sorong** 4870.91, 1316-1344 with Jakarta news and music program. Very good signal audible for several days. **RRI-Manokwari** 3987.04 noted 1100-1400 time frame. (Wilkins, CO) **RRI-Jakarta** 9524.97, 1059 with Indonesian Gamelan music, canned announcements for good, clear audio. (Valko, PA)

1556 UTC on 6080

AUSTRALIA: Radio. *Health Report* monitored with SIO 444. 5995 // 6080 at 1655. (Gerald Brookman KL7CMN, Kenai, AK) 17785, 2253 *Breakfast Club* program; 9580, 1748 // 11880. 17750, 0328 // 15515, 15240. (MacKenzie, CA)

1600 UTC on 11690

JORDAN: Radio. News headlines to item on negotiations for a Palestinian state renouncing violence. (Moser, IL) Station monitored 11690, 1400-1430; 1545-1600. (Tom Banks, Dallas, TX)

1655 UTC on 9510

UK: BBC. *Generation Next* monitored with SIO 333. *Have Your Say* on 9410, 1700 // 12095. Sports news 6195, 1558. (Brookman, AK) 17640, 1345 *News Hour* program. (Fraser, ME) **BBC** 6195, 0308. (Moser, IL)

1752 UTC on 11720

PHILIPPINES: FEBA. Two males with Chinese conversation // 15190. English and unknown language 9435, 2245; **VOA relay** 9780, 2236 *VOA News*; **VOA relay** 15290, 2240. (MacKenzie, CA) **PBS Manulas/Radio Ng Bayan** (presumed) 6169.83, 1132-1212 with weak carrier and snippets of audio. Lately on past 1300 UTC. (Wilkins, CO)

1945 UTC on 12133

USA: AFR/AFRTS via Key West, FL). Music tunes from Stevie Wonder and George Harrison. Additional US stations audible: **WBCQ** 7415, 2102. (Wood, TN) **WHRI** 9660, 1130 *Heart to Soul*. (Fraser, ME) **WINB** 13570, 2149. (MacKenzie, CA) **WWCR** 9985, 1225-1300+ (H. Frodge, MI) **WWCR** 3215, 2315. (Wood, TN)

2243 UTC on 6105

BRAZIL: Radio Cancoo Nova. Portuguese program for "Voz do Brasil" identification. Poor signal amid Radio Canada Int'l splatter. (Barbour, NH) **Radio Clube do Para** 4885, 0430-0435. (Wood, TN) **Radio Cultural Manaus** 4845, 0135-0203*. (Barbour, NH)

2300 UTC on 6925

PIRATE: Radio First Termer. First log of station with talk on Iraq and parody on Iraqi fashions. Music from the Hollies and Led Zeppelin of fair signal quality. **Take It Easy Radio** 6925USB, 2143-2224. Euro pirate-**Mystery Radio** 6220, 0347-0404. (Wood, TN)

2340 UTC on 9990

EGYPT: Radio Cairo. Closing info including identification, frequencies and address. (Fraser, ME)

Thanks to our contributors – Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times
English broadcast unless otherwise noted.

Czeching on Slovakia

This month we shine the *Programming Spotlight* on Central Europe, specifically the programming of the Czech and Slovak Republics.

Radio Slovakia International www.slovakradio.sk/

As you may know, Radio Slovakia International ceased broadcasting on shortwave in 2006, but then returned just as suddenly a few months later, at the end of October.



"Radio Slovakia International (RSI) is back on the shortwave from the 29th of October 2006.

"We are coming back to the family of listeners from all around the world, to you, who were supporting us throughout our 13 year long existence.

"Shortwave broadcast will again feature shows about Slovakia in English, French, Russian, German and Spanish language. Broadcast for the Slovaks in living abroad in Slovak will also have its firm place among these language variations.

"We are looking forward on your letters, suggestions and reactions." (RSI website)

I found the 7230 kHz broadcast at 0100 UTC to be the best frequency to hear RSI. 9440 kHz is also available, although I found it difficult to hear. RSI can also be heard online via the World Radio Network, and via its own website.

The daily half hour broadcast contains the following elements (there is no schedule available on the RSI website; this is based on my listening to the first week or so via shortwave and internet, and a few corrections thanks to a very friendly email from presenter Pete Miller):

Sunday

Sunday Newsreel - A roundup of news highlights, from the past week, day by day, followed by a mailbag version of **Slovakia**

Today hosted by Pete Miller and Katarina Korcek.

Monday

News followed by **Insight Central Europe** (see below under Radio Prague)

Tuesday

News followed by **Topical Issues** (mostly economic and financial issues when I listened) then **Slovakia Today** hosted By Anca Dragu. A variety of stories were covered, including Slovakia's spot in the "Corruption Index", Environmental assessments related to mining and NGO funding. A brief sports report aired, mainly about a tennis tournament being held in Bratislava

Wednesday

News followed by **Slovakia Today** hosted by Emilie White. She interviewed a Canadian woman (who married her Slovak boyfriend three weeks earlier) about her adjustment to life in Slovakia. She had taught English in Japan, Australia, and Slovakia. Later there was a talk about Slovak wedding traditions. Jana Pechanska (phonetic), a piano virtuoso, was then interviewed about the challenges of studying music. A piece of classical music was played (not by Jana).

Thursday

News followed by **Topical Issues** and **Slovakia Today** hosted by Michal Groch Discussion of Greenpeace Slovakia, Slovak state visit to Moscow and day 3 of the Tatra Bank Tennis tournament.

Friday

News from the Regions read by Pete Miller followed by **Topical Issues**

Slovakia Today with Pete Miller then followed. Pete said (paraphrasing) "It really does sound wonderful to say 'coming to you by shortwave' once again. Many have written, and your messages are a 'big encouragement to us to continue the fight.' The more letters and messages we get help us with our cause." E-mail and P-mail addresses were then given.

There followed a replay of some features which shortwave listeners "may have missed over the past weeks."

Saturday

The broadcast I heard opened with **Front Page Review** hosted by Pete Miller, then **Slovakia Today**, presented by Michal Groch "featuring some of the best features of the week's programming."

Observations

There are a couple of quirky things about RSI.

It has the strangest ID, usually part way through each broadcast. A female voice says



"Hi, my name is Stereo Mike (mic?). Then a male voice says "Hi, my name is Radio Slovakia International." Secondly, one must get used to them commenting on "broadcasting from the basement of the upside down pyramid in Bratislava." The radio building in Bratislava has some unique architecture.

It's nice to hear them on the air again. Their small but dedicated staff works hard to turn out a daily broadcast, without a lot of the resources of other international stations.

While putting this report together, I emailed Pete with a few questions about the programs and the spelling of one host's name (his email address was on the RSI website). Maybe it was fortunate timing, but I was impressed to receive a very prompt reply:

"My co-presenter of the Sunday listener's tribute programme is Katarina Korcek. However, she just comes in to do that programme. We have just two full time presenters, myself (Friday and Sunday) and Michal Groch (Thursday and Saturday) - he is still completing his final year at university. Then there are two other part-time team members - Anca Dragu (Tuesday) and Emilie White (Wednesday). Anca is Romanian and Emilie, who has just joined us, is Canadian. On Monday we take the **Insight Central Europe Programme**.

"We have been really encouraged by the mail we have received since going back on air two weeks ago. It seems we were greatly missed and we just hope we can continue now without the threat hanging over us which we have had for the last few years. It is good to buck the trend and be one of the few, if not the only ones, who have returned to short wave."

Czech Republic

<http://www.radio.cz/en/>

Radio Prague is well heard on shortwave via Czech transmitters, relays abroad, notably in Canada and Miami, and the World Radio Network on satellite and online. Programming



can also be heard via CBC Radio Overnight on the Radio One Network in Canada and online.

As per their website: "Every show starts with a brief bulletin of news from the Czech Republic to keep you up-to-date on events in or relating to the country. On weekdays this is followed by **Current Affairs** – a magazine offering an in-depth coverage of political, economic, social, cultural and sports events in the Czech Republic." These programs are followed by these daily features:

Monday (UTC Tuesday in North America)

One on One – this is an interesting program in which a Czech person is interviewed about their role in history or their life. A recent episode featured an interview with a woman who joined the British air force in World War II and who was persecuted (along with her family) by the Communist government. It was a fascinating story of perseverance. (Repeated on Saturday)

Tuesday (UTC Wednesday in North America)

Talking Point – (hosted by various staff) This program discusses different (usually political) issues in the Czech Republic. Recent episodes have included debate over a US anti-missile base in Central Europe, the race for Prime Minister, and Moravian songs and music as part of life.

Wednesday

Czechs in History – airs once a month, hosted by various staff members. It looks at someone whose life had an impact on Czech History. Those featured have included Jaroslav Jezek, a musical composer who would have turned 100 in 2006, Petr Novak who "wrote the soundtrack to the Prague Spring," and Vaclav Kral, a car designer.

Czechs Today – looks at some of the people and personalities shaping contemporary Czech society (also once a month). The most recent episode, as I type this, dealt with the Eastern Orthodox Church in the Czech Republic, its history and current activities. Archbishop Krystof was featured. Other recent episodes have featured the Muslim community and World War II fighter pilots.

Spotlight – This program alternates with **Czechs in History** and **Czechs Today** and features tours of different places in the Czech Republic, such as historic Rakovník, Zlín (the town made famous by Bata shoes), and the Sazava Monastery.

Thursday

Panorama – (generally hosted by Jarka Halkova) According to the Radio Prague

website it is a "weekly foray into all things Czech; from cultural and artistic trends to social phenomena." Recent programs have discussed Vaclav Havel's 70th birthday, injustice under the former communist regime and football fever in the Czech Republic.

Czech Science – (hosted by Pavla Horokava) a look at Czech science from the past and present. Topics have included AIDS in the Czech Rep, Czech medical transplantation and Toxoplasmosis (spread by cats).

Friday

Business News – a weekly round-up of business news from the Czech Republic.

The Arts – A weekly cultural report (rotating hosts)

Saturday

Magazine – "The show that starts where the news ends – we bring you the stories you might otherwise have missed." What I take this to mean is that this is a catch-all program, looking at the less significant but interesting stories which pop up from week to week.

SoundCzech – This program replaces the earlier ABCs of Czech series of "language lessons." In this new series, Czech words and phrases are taught using song lyrics.

One on One – repeat from earlier in the week.

ICE - Insight Central Europe – Central European current affairs magazine program, produced jointly by Radio Prague, Radio Austria International, Radio Slovakia, Radio Polonia and Radio Budapest and Radio Slovenia

ICE is broadcast at these times (UTC/GMT) and frequencies (kHz):

UTC	kHz	Target
0800-0827	7345; 9880	North-West Europe
1400-1429	21745	East Africa; North America
1800-1827	5930; 9415	North-West Europe; Asia; Australia
2230-2257	7345; 9435	North America; West Africa
2330-2357	5915; 7345	North America

Sunday

Mailbox – Mailbox is a regular weekly feature during which listeners letters, emails, and even phone calls are acknowledged, and questions about the Czech Republic are answered.

Letter from Prague – It's not Alistair Cooke, but each week a short two or three minute essay about Life in Prague is read. There is not a regular presenter, but each week someone different delivers the talk.

Encore – introducing Czech composers, performers and ensembles, and news from the world of Czech classical music. It is heard on the first Sunday of the month. Hosted by Patricia Goodson and David Vaughan

Magic Carpet – This program "explores the wealth of Czech 'world music', breaking down the barriers of traditional genres." It airs about every three weeks and is hosted by Petr Doruzka (who also has a website: <http://world.freemusic.cz/W-Music.htm>)

Czech Books – Airs every two weeks and is hosted by David Vaughan. It looks at Czech writing today.

Personal observations:

I first heard Radio Prague when it was the voice of the Czechoslovak Socialist Republic (CSSR). In many ways it was typical of Soviet bloc broadcasters of the time, toeing the Moscow party line, talking about how life was wonderful under socialism, and lots of statistics and lengthy monologues to prove it.

But it was also a good listen for non-political

content. There was lots of wonderful folk music, pop music and cultural features. One regular music feature (dated by today's standards) involved a regular music broadcast which included a countdown so the listener could "start their tape recorder." Broadcasts were an hour a day at the time.

Radio Prague was also *very* listener friendly. A letter or reception report to them would result in a mailbox full of magazines, pennants, books, stamps and other goodies. It makes one almost miss the Cold War ... almost!

With the end of the Cold War and the era of cutbacks, broadcasting times were reduced, and then Czechoslovakia split into the Czech and Slovak Republics. As "divorces" go, this one was rather amicable.

Today, we still get an hour of programming each day; however, it's from two different stations in two different countries now, a half hour from each.

As you can see from this report, they still manage to squeeze a lot of programming into a week.

And both stations are still very listener friendly, with an outstanding web presence. Of all websites for international broadcasters, I rank Radio Prague's as perhaps the best for ease of navigation and the sheer volume of material. Both stations make their programming available for download, too. Some of the material on the RSI website is a bit dated, and rarely updated, but as mentioned, they do a lot with limited resources.

Be sure and drop Radio Slovakia International an email or a letter. As Pete Miller says, it's nice to see a radio station bucking the trend and returning to the shortwaves.

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THE QSL REPORT

VERIFICATIONS RECEIVED BY OUR READERS

Gayle Van Horn, W4GVH

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LowFERS and MedFERS

If you're tired of the usual DX targets, here's an alternative you can try for while the DX season is prime. These may be the most unusual radio frequencies you've ever explored, and they are definitely not for the faint-hearted.

Low Frequency Experimental Radio and *Medium Frequency Experimental Radio* include stations which are unlicensed but legal; they are regulated by the Federal Communications Commission under Part 15. These two provisional services are allowed the use of 1 watt power between 160-190 kHz in the long wave bands, and 510-1705 kHz in the medium wave band. Hobbyists, depending on which bands they utilize, are called LowFERS or MedFERS.

These stations are primarily experimental beacons which transmit 24 hours a day, sending their identification in very slow Morse code, repeated continuously. Many experimenters are amateur radio opera-

tors, although it is not required. The optimum listening opportunity for LowFERS is winter, when static levels are at a minimum and propagation is usually stable. LF and MF hobbyists may hear signals from a few miles away to several hundred miles.

Most LF and MF stations welcome reception reports and will confirm readily. Verifications require a prepared QSL card or form letter, mint postage stamps and an SASE. Taped or CD reports have proven successful.

To learn more on experimenting with the LowFERS and the MedFERS, QSLing trends and more, go to the *Longwave of America* home page at: www.lwca.org or *The Master List of Part 15 Radio Stations of North America* <http://home.att.net/~weatheradio/part15.htm> Now's the time to explore this interesting DX during the current prime listening period.

AMATEUR RADIO

Belgium, ON4AMX 10 meters SSB. Two full data photo cards. Received in 65 days via ARRL bureau. ON4UN 20 meters SSB. Full data photo card via ARRL bureau. (L. Van Horn, NC)

Ireland, EI9JF 20 meters CW. Full data amateur card. Received in three weeks for a SWL card and one U.S. dollar. ARO QSL address: Nicky Mullally, Eyrefield Road, Curragh Co., Kildare, Ireland. (Greg Harris WDX9KHY, Forest Park, IL)

Mayotte, TX5NK 20 meters RTTY. Full data color card. Received in 51 days for a nested envelope with SAE. ARO QSL address: Via DJ8NK Jan B.C. Harders, Kalkreuthweg 17D-22607 Hamburg, Germany. (Ken Reitz KS4ZR, VA)

Thailand, HS0ZBS 20 meters RTTY. Full data color QSL. Received in 34 days for a nested envelope with SAE. ARO QSL address: Kurt Brauer, P.O. Box 75, Phanom-Sarakham Chachoengsao 24120 Thailand. Our QSO happened at the time of the military coup. I was concerned the mail would be disrupted, but the QSL came in just over a month! (Reitz, VA)

CLANDESTINE

Myanmar, S.H.A.N./Shan Herald Agency for News. Partial data letter signed by Khuensai Jaiyen-Director. Broadcast from Democratic Voice of Burma via Yerevan on 15480, Wertachtal 9490 and Radio Free Asia via Tinian on 9455 kHz. Letter noted this is the first time they have received "feedback from any real outsiders and we do appreciate your taking the time and trouble to let us know." (Wendel Craighead, Prairie Village, KS)

GUAM

AFRTS/American Forces Radio & TV 5765 kHz USB. Full data AFRTS card signed by Robert Winkler. Received in seven days via regular mail by posting at QSL@dodmedia.osd.mil (John Wilkins, Wheat Ridge, CO) <http://myafn.dodmedia.osd.mil/> Correspondence may also be sent to: American Forces Network, Department of Defense, NMC Det AFRTS - DMC, 23755 Z Street, Bldg. 2730, Riverside, CA 92518-2017

MALI

China Radio International relay, 13630 kHz. No-data card signed by Ying Lian, plus schedules and artwork. Received in 56 days for an English report. Station address: CR-2, China Radio Int'l, P.O. Box 4216, Beijing, P.R. China 100040. (Joe Wood, Greenback, TN)

MEDIUM WAVE

Canada, CKDO 1580 AM kHz. Full data QSL card signed by Gary Bunaide(?). Received in 28 days for CD report of DX Test. Station address: Durham Radio Inc., 1200 Airport Blvd., Suite # 207, Oshawa, Ontario, Canada L1J 8P5. Ontario QSL # 31. (Patrick Martin, Seaside, OR)

Japan-JOWL Asahikawa 1197 AM kHz. Full data STV cartoon QSL card, plus letter signed by Y. Matsuzaki, and station schedule. Received for an AM report. Station address: Nishi 8-Chome, Kita 1-jo, Chuo-Ku, Sapporo 060-8705 Japan. (Craig Edwards, NT, Australia)

Mexico-XEPE 1700 AM kHz. Full data electronic QSL from Bill Lipis-Chief Engineer. Received in two days for report posted to blipis@earthlink.net (Martin, OR) Station address: Blvd. Benito, Juárez 500, Local 2-B, Plaza Cuchuma, 21450 Tecate, BC México. (Martin, OR)

USA, WVVM, 1670 kHz (ex-WMWR) Dry Branch, GA. "Thank you for your reception" paper card with illegible signature plus station transmitter info. Received in three months for an AM report. QSL address: 7080 Industrial Hwy., Macon, GA 31216-7538. (Ed Kusalik, Alberta, Canada)

MOLDOVA

Voice of Russia relay via Kishinyov, 9665 kHz. Full data *Assault on Sapun Hill* card unsigned. Received in 43 days for an English report and two IRCs, plus frequency schedules and report form. Station address: ul. Pyatnitskaya 25, 115326 Moscow, Russia. (Bill Wilkins, Springfield, MO)

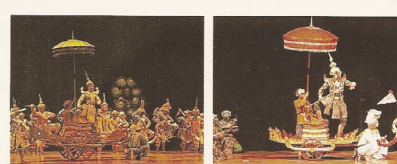
NETHERLANDS ANTILLES

Radio Netherlands via Bonaire relay 9890 kHz. Full data card unsigned with site notation, plus *On Target* newsletter and sticker. Received in 30 days for an English report and one IRC. Station address: Radio Nederland Wereldomroep, P.O. Box 222, 1200 JG Hilversum, The Netherlands. (Frank Hillton, Charleston, SC)



THAILAND

Radio Thailand 9680, 9810 kHz One full data *Masked Play* card with illegible signature, verifying both frequencies via Udon Thani. Received in 63 days for two English reports and return mint postage. Station address: 236 Vibhavadi Rangsit Road, Huai Khwang, Bangkok 10320, Thailand. Web: www.hsk9.com (Tom Banks, Dallas, TX)



KHON (Masked Play)



RADIO THAILAND

UNITED KINGDOM

Leading the Way, 15495 kHz. Full data QSL card with illegible signature and transmitter site noted for Russian broadcast. Received in ten days for report to: qsl@leadingtheway.org. Kusalik, (CAN) Station transmits via VT Merlin Communications and various shortwave religious broadcasters. Correspondence may also be directed to: P.O. Box 20100, Atlanta, GA 30325. Web: www.leadingtheway.org. (GVH)

UNITED STATES

AFRTS/American Forces Radio & TV 6350 kHz USB. Full data AFRTS card signed by Robert Winkler. Received in two days via regular mail by posting at QSL@dodmedia.osd.mil (Craighead, KS)



HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
 ① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Standard Time) 5, 6, 7 or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Day Codes	
s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly
occ:	occasional
DRM:	Digital Radio Mondiale

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions.

But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas	
af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFP)
me:	Middle East
na:	North America
oc:	Oceania
pa:	Pacific
sa:	South America
va:	various

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Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Rich D'Angelo/NASWA Flash Sheet; Alokesh Gupta, New Delhi, India; Bob Fraser, Belfast, ME; Anker Petersen/DX Window; Alan Roe, UK; Ivo Ivanov; Noel Green, UK; Adrian Sainsbury/R.NZ Intl; Harold Sellers/ODXA/DX Ontario; Robert E. Thomas, Bridgeport, CT; Jose Jacobs VU2JOS, India; Wolfgang Bueschel, Germany; Andreas Volk, Germany; BCL News; Cumbre DX; Hard Core DX; NASWA Journal; WWDXC-Top News.

Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes

- Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.
- Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.
- Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007. They are only authorized on a non-interference basis until that date.
- Note 4 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide.

GLENN HAUSER'S WORLD OF RADIO

<http://www.worldofradio.com>

For the latest DX and programming news, amateur nets, DX program schedules, audio archives and much more!

0000 UTC - 7PM EST / 6PM CST / 4PM PST

0000	0015	Japan, Radio Japan/NHK World	13650as	
		17810as		
0000	0030	Australia, Radio 9660as	12080as	13670as
		15240pa	17715as	17750va
		17795va		17775va
0000	0030	Burma, Dem Voice of Burma	5955eu	
0000	0030	Egypt, Radio Cairo	11885na	
0000	0030	Thailand, Radio 9680af		
0000	0030	UK, BBC World Service	3915as	11945as
		17615as		
0000	0030	USA, Voice of America	7405as	
0000	0045	India, All India Radio	9705as	9950as
		11620as	11645as	13605as
0000	0057	Canada, Radio Canada Intl	9880as	
0000	0057	Canada, Radio Canada Intl	9755am	
0000	0057	Netherlands, Radio	6165na	
0000	0059	Spain, Radio Exterior Espana	6055am	
0000	0100	Anguilla, University Network	6090am	
0000	0100	Australia, ABC NT Alice Springs		2310do
		4835do		
0000	0100	Australia, ABC NT Katherine	5025do	
0000	0100	Australia, ABC NT Tennant Creek		4910do
0000	0100	Bulgaria, Radio 7400na	9700na	
0000	0100	Canada, CFRX Toronto ON	6070na	
0000	0100	Canada, CFVP Calgary AB	6030na	
0000	0100	Canada, CKZN St John's NF	6160na	
0000	0100	Canada, CKZU Vancouver BC		6160na
0000	0100	China, China Radio Intl	6020na	6075as
		7130as	7180as	9425na
		11650as	11885as	9570as
0000	0100	Costa Rica, University Network		5030va
		6150va	7375va	9725va
0000	0100	Germany, Deutsche Welle	7265as	9900as
		15320as		
0000	0100	Guyana, Voice of 3291do		
0000	0100	Japan, Radio Japan/NHK World		6145na
0000	0100	Malaysia, RTM/Trax FM	7295as	
0000	0100	Namibia, Namibian BC Corp	3270do	3290do
		6060do	6175do	
0000	0100	New Zealand, Radio NZ Intl	15720pa	
0000	0100	New Zealand, Radio NZ Intl	17675pa	
0000	0100	Papua New Guinea, Wantok R. Light		7120va
0000	0100	Singapore, MediaCorp Radio	6150do	
0000	0100	UK, BBC World Service	5970as	6195as
		9605as	9740as	11955as
		15360as		15285as
0000	0100	UK, BBC World Service	6010na	
0000	0100	UK, Bible Voice	6140me	
0000	0100	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb	7812usb
		12133usb	13362usb	12579usb
0000	0100	USA, KAIJ Dallas TX	5755na	
0000	0100	USA, KTN Salt Lake City UT	7505na	15590na
0000	0100	USA, WBCQ Kennebunk ME	5110na	7415na
		9330na		
0000	0100	USA, WBOH Newport NC	5920am	
0000	0100	USA, WEWN Birmingham AL	5810va	
0000	0100	USA, WHRA Greenbush ME	5850na	
0000	0100	USA, WHRI Cypress Creek SC		7315am
		7490am		
0000	0100	USA, WINB Red Lion PA	9265am	
0000	0100	USA, WRMI Miami FL	7385na	
0000	0100	USA, WRMI Miami FL	9955am	
0000	0100	USA, WTJC Newport NC	9370na	
0000	0100	USA, WWCR Nashville TN	3215na	5070na
		7465na	13845na	
0000	0100	USA, WWRB Manchester TN	6890na	
0000	0100	USA, WYFR/Family R Okeechobee FL	6085na	
		9505na	9715na	11720am
0000	0100	Zambia, Christian Voice	4965af	
0005	0030	Austria, Radio Austria Intl	7325na	
0013	0028	Austria, Radio Austria Intl	7325na	
0030	0045	Germany, Pan American BC	9640as	
0030	0100	Australia, Radio 9660as	12080as	13670as
		15240pa	15415as	17715as
		17795va		17750va
0030	0100	Greece, Voice of 7475eu	9420eu	
0030	0100	Lithuania, Radio Vilnius	9825na	
0030	0100	Thailand, Radio 5890na		
0030	0100	USA, Voice of America	7120va	9620va
		11695va	11725va	11805va
		15185va	15205va	12005va
0033	0100	Austria, Radio Austria Intl	7325na	
0043	0058	Austria, Radio Austria Intl	7325na	
0055	0100	Italy, RAI Intl	11800na	

0100 UTC - 8PM EST/ 7PM CST / 5PM PST

0100	0115	Italy, RAI Intl	11800na	
0100	0127	Czech Rep, Radio Prague	6200na	7345na
0100	0128	Vietnam, Voice of 6175na		
0100	0130	Germany, Universal Life	9480as	
0100	0130	Greece, Voice of 7475eu	9420eu	
0100	0130	Slovakia, Radio Slovakia Int	7230na	9440sa
0100	0156	Romania, Radio Romania Intl	6150na	9515na
0100	0157	Canada, Radio Canada Intl	5840as	5970as
0100	0157	Netherlands, Radio	6165na	
0100	0159	Canada, Radio Canada Intl	9755am	
0100	0200	Anguilla, University Network	6090am	
0100	0200	Australia, ABC NT Katherine	5025do	
0100	0200	Australia, ABC NT Tennant Creek		4910do
0100	0200	Australia, Radio 9660as	12080as	13670as
		15240pa	15415as	15515as
		17750va	17795va	21745va
0100	0200	Canada, CFRX Toronto ON	6070na	
0100	0200	Canada, CFVP Calgary AB	6030na	
0100	0200	Canada, CKZN St John's NF	6160na	
0100	0200	Canada, CKZU Vancouver BC		6160na
0100	0200	China, China Radio Intl	6005na	6020na
		6075as	6080na	7130eu
		9570na	9580na	11650as
0100	0200	Costa Rica, University Network		5030va
		6150va	7375va	9725va
0100	0200	Cuba, Radio Havana	6000na	6060na
		6180na		
0100	0200	Guyana, Voice of 3291do		
0100	0200	Indonesia, Voice of	9525as	11785pa
		15150al		
0100	0200	Japan, Radio Japan/NHK World		6030va
		11860as	11935sa	15325as
		17810as	17825ca	17845as
0100	0200	Malaysia, RTM/Trax FM	7295as	
0100	0200	Namibia, Namibian BC Corp	3270do	3290do
		6060do	6175do	
0100	0200	New Zealand, Radio NZ Intl	15720pa	
0100	0200	New Zealand, Radio NZ Intl	17675pa	
0100	0200	North Korea, Voice of Korea	7140as	9345as
		9730am	11735am	13760am
0100	0200	Papua New Guinea, Wantok R. Light		7120va
0100	0200	Singapore, MediaCorp Radio	6150do	
0100	0200	Sri Lanka, SLBC	6005as	9770as
0100	0200	Taiwan, Radio Taiwan Intl	11875na	15465na
0100	0200	UK, BBC World Service	7320as	9605as
		11955as	15285as	15310as
0100	0200	UK, Bible Voice	6140me	
0100	0200	Ukraine, Radio Ukraine Intl	5820na	
0100	0200	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb	7812usb
		12133usb	13362usb	12579usb
0100	0200	USA, KAIJ Dallas TX	5755na	
0100	0200	USA, KTN Salt Lake City UT	7505na	
0100	0200	USA, KWHR Naalehu HI	17655as	
0100	0200	USA, Voice of America	11705va	12005va
0100	0200	USA, WBCQ Kennebunk ME	5110na	7415na
		9330na		
0100	0200	USA, WBOH Newport NC	5920am	
0100	0200	USA, WEWN Birmingham AL	5810va	
0100	0200	USA, WHRA Greenbush ME	5850na	
0100	0200	USA, WHRI Cypress Creek SC		5860am
		7490am		
0100	0200	USA, WHRI Cypress Creek SC		7315am
0100	0200	USA, WINB Red Lion PA	9265am	
0100	0200	USA, WRMI Miami FL	7385na	
0100	0200	USA, WRMI Miami FL	9955am	
0100	0200	USA, WTJC Newport NC	9370na	
0100	0200	USA, WWCR Nashville TN	3215na	5070na
		5935na	7465na	
0100	0200	USA, WWRB Manchester TN	6890na	
0100	0200	USA, WYFR/Family R Okeechobee FL	6065na	
		9505na	15195as	
0100	0200	Uzbekistan, Christian Vision	7355as	
0100	0200	Zambia, Christian Voice	4965af	
0115	0130	Seychelles, FEBA	5885as	
0130	0200	Iran, Voice of the Islamic Rep	6120na	7160na
0130	0200	Sweden, Radio 11550va		
0130	0200	USA, Voice of America	5960va	
0130	0200	USA, Voice of America	7405va	
0140	0200	Vatican City, Vatican Radio	5915va	7335va

0200 UTC - 9PM EST / 8PM CST / 6PM PST

0200	0227	Czech Rep, Radio Prague	6200na	7345na
0200	0227	Iran, Voice of the Islamic Rep	6120na	7160na
0200	0228	Hungary, Radio Budapest	6110na	
0200	0300	Anguilla, University Network	6090am	
0200	0300	Argentina, RAE	11710am	

0200	0300	Australia, ABC NT Alice Springs	2310do	
		4835do		
0200	0300	Australia, ABC NT Katherine	5025do	
0200	0300	Australia, ABC NT Tennant Creek	4910do	
0200	0300	Australia, Radio 9660as	12080as	13670as
		15240pa	15415as	15515as
		21725va		17750va
0200	0300	Canada, CFRX Toronto ON	6070na	
0200	0300	Canada, CFVP Calgary AB	6030na	
0200	0300	Canada, CKZN St John's NF	6160na	
0200	0300	Canada, CKZU Vancouver BC	6160na	
0200	0300	China, China Radio Intl	11770as	13640as
0200	0300	Costa Rica, University Network	5030va	
		6150va	7375va	9725va
0200	0300	Cuba, Radio Havana	6000na	6060na
		6180na		
0200	0300	Egypt, Radio Cairo	7270na	
0200	0300	Guyana, Voice of 3291do		
0200	0300	Malaysia, RTM/Trax FM	7295as	
0200	0300	Namibia, Namibian BC Corp	3270do	3290do
		6060do	6175do	
0200	0300	New Zealand, Radio NZ Intl	15720pa	
0200	0300	New Zealand, Radio NZ Intl	17675pa	
0200	0300	North Korea, Voice of Korea	13650as	15100as
0200	0300	Papua New Guinea, Wantok R. Light	7120va	
0200	0300	Philippines, Radio Pilipinas	11885va	15270va
		17665va		
0200	0300	Russia, Voice of 6230na	7250na	13665na
		15425na		
0200	0300	Singapore, MediaCorp Radio	6150do	
0200	0300	South Korea, KBS World Radio	9560na	
		15575na		
0200	0300	Sri Lanka, SLBC 6005as	9770as	15745as
0200	0300	UK, BBC World Service	6035af	6195as
		7320as	11750as	11955as
		15310as	15360as	17760as
0200	0300	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb	7812usb
		12133usb	13362usb	10320usb
0200	0300	USA, KAIJ Dallas TX	5755na	
0200	0300	USA, KJES Vado NM	7555na	
0200	0300	USA, KTVN Salt Lake City UT	7505na	
0200	0300	USA, KWHR Naalehu HI	17655as	
0200	0300	USA, WBCQ Kennebunk ME	5110na	7415na
		9330na		
0200	0300	USA, WBOH Newport NC	5920am	
0200	0300	USA, WEWN Birmingham AL	5810va	
0200	0300	USA, WHRA Greenbush ME	5850na	
0200	0300	USA, WHRI Cypress Creek SC	7315am	
0200	0300	USA, WHRI Cypress Creek SC	5860am	
		7490am		
0200	0300	USA, WINB Red Lion PA	9265am	
0200	0300	USA, WRMI Miami FL	7385na	
0200	0300	USA, WRMI Miami FL	9955am	
0200	0300	USA, WTJC Newport NC	9370na	
0200	0300	USA, WWCR Nashville TN	3215na	5070na
		5765na	5935na	
0200	0300	USA, WWRB Manchester TN	6890na	
0200	0300	USA, WYFR/Family R Okeechobee FL	5985am	
		6065na	9505na	9525na
0200	0300	Uzbekistan, Christian Vision	7355as	
0200	0300	Zambia, Christian Voice	4965af	
0200	0300	Taiwan, Radio Taiwan Intl	5950na	9680na
0215	0220	Vatican City, Vatican Radio	12070va	
0215	0230	Nepal, Radio 3230as	5005as	6100as
		7165as		
0230	0258	Vietnam, Voice of 6175na		
0230	0300	Sweden, Radio 6010na		
0245	0300	Albania, Radio Tirana	6115eu	7465eu
0245	0300	Myanmar, Radio 9730do		
0250	0300	Vatican City, Vatican Radio	7305am	9610am

0300 UTC - 10PM EST / 9PM CST / 7PM PST

0300	0315	Croatia, Croatian Radio	7285na	
0300	0320	Vatican City, Vatican Radio	7305am	9610am
0300	0330	Egypt, Radio Cairo	7270na	
0300	0330	Myanmar, Radio 9730do		
0300	0330	Philippines, Radio Pilipinas	11885va	15270va
		17665va		
0300	0330	Swaziland, TWR 3200af		
0300	0330	Thailand, Radio 5890na		
0300	0330	USA, KJES Vado NM	7555na	
0300	0330	USA, WBCQ Kennebunk ME	9330na	
0300	0330	Vatican City, Vatican Radio	7360af	
0300	0358	Germany, Deutsche Welle	7330as	9480as
		9785as		
0300	0400	Anguilla, University Network	6090am	
0300	0400	Australia, ABC NT Alice Springs	2310do	
		4835do		
0300	0400	Australia, ABC NT Katherine	5025do	

0300	0400	Australia, ABC NT Tennant Creek	4910do	
0300	0400	Australia, Radio 9660as	12080as	13670as
		15240pa	15415as	15515as
		21725va		17750va
0300	0400	Bulgaria, Radio 7400na	9700na	
0300	0400	Canada, CBC NQ SW Service	9625na	
0300	0400	Canada, CFRX Toronto ON	6070na	
0300	0400	Canada, CFVP Calgary AB	6030na	
0300	0400	Canada, CKZN St John's NF	6160na	
0300	0400	Canada, CKZU Vancouver BC	6160na	
0300	0400	China, China Radio Intl	6190na	9460as
		9690na	9790na	11770as
		15110as	15120as	13620as
0300	0400	Costa Rica, University Network	5030va	
		6150va	7375va	9725va
0300	0400	Cuba, Radio Havana	6000na	6060na
		6180na		
0300	0400	Guyana, Voice of 3291do		
0300	0400	Japan, Radio Japan/NHK World	21610pa	
0300	0400	Malaysia, RTM/Trax FM	7295as	
0300	0400	Malaysia, RTM/Voice of Malaysia	6175as	
		9750as	15295as	
0300	0400	Namibia, Namibian BC Corp	3270do	3290do
		6060do	6175do	
0300	0400	New Zealand, Radio NZ Intl	15720pa	
0300	0400	New Zealand, Radio NZ Intl	17675pa	
0300	0400	North Korea, Voice of Korea	7140as	9345as
		9730as		
0300	0400	Papua New Guinea, Wantok R. Light	7120va	
0300	0400	Russia, Voice of 5995me	6240na	7350na
		13665na	15425na	
0300	0400	Rwanda, Radio 6055do		
0300	0400	Singapore, MediaCorp Radio	6150do	
0300	0400	South Africa, Channel Africa	3345af	7390af
0300	0400	Sri Lanka, SLBC 6005as	9770as	15745as
0300	0400	Taiwan, Radio Taiwan Intl	5950na	15215sa
		15320as		
0300	0400	UK, BBC World Service	6195as	
0300	0400	UK, BBC World Service	3255af	6005me
		6145af	6190af	7130af
		9410as	9750af	11760as
		15360as	17760as	21660as
0300	0400	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb	7812usb
		12133usb	13362usb	10320usb
0300	0400	USA, KAIJ Dallas TX	5755na	
0300	0400	USA, KTVN Salt Lake City UT	7505na	
0300	0400	USA, KWHR Naalehu HI	17655as	
0300	0400	USA, Voice of America	4930af	6080af
		15580af		
0300	0400	USA, WBCQ Kennebunk ME	5110na	7415na
0300	0400	USA, WBOH Newport NC	5920am	
0300	0400	USA, WEWN Birmingham AL	5810va	
0300	0400	USA, WHRA Greenbush ME	5850na	
0300	0400	USA, WHRI Cypress Creek SC	7315am	
		6110am	7520am	5860am
0300	0400	USA, WHRI Cypress Creek SC	7315am	
0300	0400	USA, WINB Red Lion PA	9265am	
0300	0400	USA, WRMI Miami FL	7385na	
0300	0400	USA, WRMI Miami FL	9955am	
0300	0400	USA, WTJC Newport NC	9370na	
0300	0400	USA, WWCR Nashville TN	3215na	5070na
		5765na	5935na	
0300	0400	USA, WWRB Manchester TN	6890na	
0300	0400	USA, WYFR/Family R Okeechobee FL	6065na	
		9505na	9985am	11740am
0300	0400	Uzbekistan, Christian Vision	13685as	
0300	0400	Zambia, Christian Voice	4965af	
0300	0400	Zimbabwe, ZBC Corp	5975do	
0300	0500	UK, Sudan Radio Service	7120af	
0315	0330	Ecuador, HCJB 9745va		
0330	0345	Ecuador, HCJB 6065va		
0330	0358	Hungary, Radio Budapest	6035na	
0330	0358	Vietnam, Voice of 6175am		
0330	0400	Sweden, Radio 6010na		
0330	0400	UK, BBC World Service	11665af	
0330	0400	USA, WBCQ Kennebunk ME	9330na	
0345	0400	Albania, Radio Tirana	6115eu	7465eu

0400 UTC - 11PM EST / 10PM CST / 8PM PST

0400	0427	Czech Rep, Radio Prague	5990na	6200na
		7345na		
0400	0430	Australia, Radio 9660as	12080as	13670as
		15240pa	15515as	17750va
0400	0430	France, Radio France Intl	7270af	7315af
		9805af		
0400	0447	Germany, Deutsche Welle	7225af	
0400	0456	Romania, Radio Romania Intl	6115va	9515na
		9690va	11895va	
0400	0500	Anguilla, University Network	6090am	

0400	0500		Australia, ABC NT Alice Springs	2310do	
			4835do		
0400	0500		Australia, ABC NT Katherine	5025do	
0400	0500		Australia, ABC NT Tennant Creek	4910do	
0400	0500	twhf	Canada, CBC NQ SW Service	9625na	
0400	0500		Canada, CFRX Toronto ON	6070na	
0400	0500		Canada, CKZN St John's NF	6160na	
0400	0500		Canada, CKZU Vancouver BC	6160na	
0400	0500		China, China Radio Intl	6190na	9460as
			13620as	15120as	17725as
0400	0500		Costa Rica, University Network	5030va	
			6150va	7375va	9725va
0400	0500		Cuba, Radio Havana	6000na	6060na
			6180na		
0400	0500		Germany, Deutsche Welle	5905af	6180af
			9565af	15445af	
0400	0500		Guyana, Voice of	3291do	
0400	0500		Malaysia, RTM/Trax FM	7295as	
0400	0500		Malaysia, RTM/Voice of Malaysia	6175as	
			9750as	15295as	
0400	0500	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
0400	0500		New Zealand, Radio NZ Intl	15720pa	
0400	0500	DRM	New Zealand, Radio NZ Intl	17675pa	
0400	0500		Nigeria, Radio/Kaduna	6090do	
0400	0500	vl	Papua New Guinea, Wantok R. Light	7120va	
0400	0500		Russia, Voice of	7150na	7350na
			12030na	13655na	15425na
0400	0500	vl	Rwanda, Radio	6055do	
0400	0500		Singapore, MediaCorp Radio	6150do	
0400	0500		South Africa, Channel Africa	3345af	
0400	0500		Turkey, Voice of	6020na	7240as
0400	0500	vl	Uganda, Radio	4976do	5026do
0400	0500		UK, BBC World Service	3255af	6005af
			6190af	6195eu	7120af
			11665af	11760as	12095af
			15360as	15575as	17760as
			21660as		
0400	0500	DRM	UK, BBC World Service	6010na	
0400	0500		Ukraine, Radio Ukraine Intl	6150na	9515as
0400	0500		USA, American Forces Radio	4319usb	5446usb
			5765usb	6350usb	7812usb
			12133usb	13362usb	12579usb
0400	0500		USA, KAIJ Dallas TX	5755na	
0400	0500		USA, KTNB Salt Lake City UT	7505na	
0400	0500		USA, KWHR Naalehu HI	17655as	
0400	0500		USA, Voice of America	4930af	4960af
			6080af	9885af	15580af
0400	0500		USA, WBCQ Kennebunk ME	5110na	7415na
0400	0500		USA, WBOH Newport NC	5920am	
0400	0500		USA, WEWN Birmingham AL	5810va	5850va
0400	0500		USA, WHRA Greenbush ME	5850na	
0400	0500		USA, WHRI Cypress Creek SC	5860am	
			7490am		
0400	0500	sm	USA, WHRI Cypress Creek SC	7315am	
0400	0500		USA, WMLK Bethel PA	9265eu	
0400	0500	thwhf	USA, WRMI Miami FL	7385na	
0400	0500	sm	USA, WRMI Miami FL	9955am	
0400	0500		USA, WTJC Newport NC	9370na	
0400	0500		USA, WWCR Nashville TN	3215na	5070na
			5765na	5935na	
0400	0500		USA, WWRB Manchester TN	6890na	
0400	0500		USA, WYFR/Family R Okeechobee FL	6065na	
			6855na	7780va	9505na
0400	0500		Uzbekistan, Christian Vision	13685as	
0400	0500		Zambia, Christian Voice	4965af	6065af
0400	0500	vl	Zimbabwe, ZBC Corp	5975do	
0430	0445		Israel, Kol Israel	6280va	17600va
0430	0457		Czech Rep, Radio Prague	9890na	
0430	0500		Australia, CVC International	15515as	
0430	0500		Australia, Radio	9660as	13670as
			15240pa	15415as	15515va
			21725va		
0430	0500		Nigeria, Radio/Ibadan	6050do	
0430	0500		Nigeria, Radio/Kaduna	4770do	
0430	0500		Nigeria, Radio/Lagos	3326do	4990do
0430	0500	mtwhf	Swaziland, TWR	3200af	
0445	0500		Italy, RAI Intl	5965af	6120af
					7170af

0500 UTC - 12AM EST / 11PM CST / 9PM PST

0500	0507	twhf	Canada, CBC NQ SW Service	9625na	
0500	0530	mtwhf	France, Radio France Intl	9805af	11995af
			13680af		
0500	0530		Germany, Deutsche Welle	6180af	7285af
			9755af	12045af	15410af
0500	0530	vl	Rwanda, Radio	6055do	
0500	0530		Vatican City, Vatican Radio	7360af	9660af
			11625af		
0500	0555		South Africa, Channel Africa	7240af	9685af
0500	0557		Netherlands, Radio	6165na	

0500	0558		New Zealand, Radio NZ Intl	15720pa	
0500	0558	DRM	New Zealand, Radio NZ Intl	17675pa	
0500	0600		Anguilla, University Network	6090am	
0500	0600		Australia, ABC NT Alice Springs	2310do	
			4835do		
0500	0600		Australia, ABC NT Katherine	5025do	
0500	0600		Australia, ABC NT Tennant Creek	4910do	
0500	0600		Australia, CVC International	15515as	
0500	0600		Australia, Radio	9660as	12080as
			15160as	15240pa	15515as
0500	0600		Bhutan, BBS	6035as	
0500	0600		Canada, CFRX Toronto ON	6070na	
0500	0600		Canada, CKZN St John's NF	6160na	
0500	0600		Canada, CKZU Vancouver BC	6160na	
0500	0600		China, China Radio Intl	5960na	6190na
			7220af	11880as	15350as
			17505va	17540as	17725as
0500	0600		Costa Rica, University Network	5030va	
			6150va	7375va	9725va
0500	0600		Cuba, Radio Havana	6000na	6060na
			6180na	9550va	11760va
0500	0600		Germany, CVC The Voice Africa	9555af	
0500	0600		Guyana, Voice of	3291do	
0500	0600		Japan, Radio Japan/NHK World	5975eu	
			6110na	7230eu	15195as
			21755pa		
0500	0600		Malaysia, RTM/Trax FM	7295as	
0500	0600		Malaysia, RTM/Voice of Malaysia	6175as	
			9750as	15295as	
0500	0600	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
0500	0600		Nigeria, Radio/Ibadan	6050do	
0500	0600		Nigeria, Radio/Kaduna	4770do	6090do
0500	0600		Nigeria, Radio/Lagos	3326do	4990do
0500	0600		Nigeria, Voice of	15120af	
0500	0600	vl	Papua New Guinea, Wantok R. Light	7120va	
0500	0600		Russia, Voice of	7150na	7350na
			13665na	15425na	
0500	0600		Singapore, MediaCorp Radio	6150do	
0500	0600	Sat/Sun	Swaziland, TWR	4775af	
0500	0600	mtwhf	Swaziland, TWR	6120af	9500af
0500	0600	vl	Uganda, Radio	4976do	5026do
0500	0600		UK, BBC World Service	3255af	6005as
			6190af	6195af	7160af
			11665af	11695as	11760as
			11955as	12095eu	15310as
			17640af	17760as	17790as
0500	0600	mtwhf	UK, BBC World Service	15420af	
0500	0600	vl/ mtwhf	UK, Sudan Radio Service	9525af	
0500	0600		USA, American Forces Radio	4319usb	5446usb
			5765usb	6350usb	7812usb
			12133usb	13362usb	12579usb
0500	0600		USA, KAIJ Dallas TX	5755na	
0500	0600		USA, KTNB Salt Lake City UT	7505na	
0500	0600		USA, KWHR Naalehu HI	11565as	13650as
0500	0600		USA, Voice of America	4930af	6080af
			9885af	15580af	
0500	0600		USA, WBCQ Kennebunk ME	5110na	7415na
0500	0600		USA, WBOH Newport NC	5920am	
0500	0600		USA, WEWN Birmingham AL	5850va	7570va
0500	0600		USA, WHRA Greenbush ME	7555na	
0500	0600		USA, WHRI Cypress Creek SC	5860am	
			7490am		
0500	0600	sm	USA, WHRI Cypress Creek SC	7315am	
0500	0600		USA, WMLK Bethel PA	9265eu	
0500	0600		USA, WRMI Miami FL	9955am	
0500	0600		USA, WTJC Newport NC	9370na	
0500	0600		USA, WWCR Nashville TN	3215na	5070na
			5765na	5935na	
0500	0600		USA, WWRB Manchester TN	3185na	5085na
0500	0600		USA, WYFR/Family R Okeechobee FL	6855na	
			7520va		
0500	0600		Uzbekistan, Christian Vision	13685as	
0500	0600		Zambia, Christian Voice	4965af	6065af
0500	0600	vl	Zimbabwe, ZBC Corp	5975do	
0525	0600	vl	Ghana, Ghana BC Corp	3366do	4915do
0530	0600		Thailand, Radio	13770eu	
0545	0600	vl	Rwanda, Radio	6055do	
0559	0600		New Zealand, Radio NZ Intl	9870pa	
0559	0600	DRM	New Zealand, Radio NZ Intl	9890pa	

0600 UTC - 1AM EST / 12AM CST / 10PM PST

0600	0615	as	South Africa, TWR	11640af	
0600	0620		Vatican City, Vatican Radio	4005eu	7250eu
0600	0630		Australia, Radio	9660as	12080as
			15160as	15240pa	15515as
0600	0630	mtwhf	France, Radio France Intl	7315af	9865af
			11995af	13680af	15160af
0600	0630		Germany, Deutsche Welle	7240af	7285af
			9565af	12045af	

0600	0630		USA, Voice of America	6080af	6105af
			9885af 15580af		
0600	0645	mtwhf	South Africa, TWR 11640af		
0600	0700		Anguilla, University Network	6090am	
0600	0700		Australia, ABC NT Alice Springs		2310do
			4835do		
0600	0700		Australia, ABC NT Katherine	5025do	
0600	0700		Australia, ABC NT Tennant Creek		4910do
0600	0700		Australia, CVC International	15515as	15335as
0600	0700		Canada, CFRX Toronto ON	6070na	
0600	0700		Canada, CFVP Calgary AB	6030na	
0600	0700		Canada, CKZN St John's NF	6160na	
0600	0700		Canada, CKZU Vancouver BC		6160na
0600	0700		China, China Radio Intl	6115na	11750af
			11770as 11880as 13645as		15140as
			15350as 15465as 17505va		17540as
			17710as		
0600	0700		Costa Rica, University Network		5030va
			6150va 7375va 9725va		11870va
0600	0700		Cuba, Radio Havana	6000va	6060va
			6180na 9550va 11760va		
0600	0700		Germany, CVC The Voice Africa		9555af
0600	0700		Germany, Deutsche Welle	6140eu	
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do
0600	0700		Guyana, Voice of 3291do		
0600	0700		Japan, Radio Japan/NHK World		7230eu
			11690va 11715eu 11740as		17870pa
0600	0700		Liberia, ELWA	4760do	
0600	0700		Malaysia, RTM/Trax FM	7295as	
0600	0700		Malaysia, RTM/Voice of Malaysia		6175as
			9750as 15295as		
0600	0700	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do 6175do		
0600	0700		New Zealand, Radio NZ Intl	9870pa	
0600	0700	DRM	New Zealand, Radio NZ Intl	9890pa	
0600	0700		Nigeria, Radio/Ibadan	6050do	
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do
0600	0700		Nigeria, Radio/Lagos	3326do	4990do
0600	0700		Nigeria, Voice of 15120af		
0600	0700	vl	Papua New Guinea, Wantok R. Light		7120va
0600	0700		Russia, Voice of 11575eu	17665oc	17805oc
0600	0700	irreg/ vl	Sierra Leone, SLBS	3316do	
0600	0700		Singapore, MediaCorp Radio	6150do	
0600	0700	vl	Solomon Islands, SIBC	5020do	9545do
0600	0700		South Africa, Channel Africa	7240af	15255af
0600	0700	Sat/Sun	Swaziland, TWR 4775af		
0600	0700		Swaziland, TWR 6120af	9500af	
0600	0700		UK, BBC World Service	6005af	6190af
			6195eu 7160eu 9410eu		11675as
			11940af 12095eu 11765af		11955as
			15360as 15420af 15575as		17640af
			17760as 17790as 21660as		
0600	0700		USA, American Forces Radio	4319usb	5446usb
			5765usb 6350usb 7812usb		10320usb
			12133usb 13362usb 12579usb		
0600	0700		USA, KAIJ Dallas TX	5755na	
0600	0700		USA, KTBN Salt Lake City UT	7505na	
0600	0700		USA, KWHR Naalehu HI	11565as	13650as
0600	0700		USA, WBCQ Kennebunk ME	5110na	7415na
0600	0700		USA, WBOH Newport NC	5920am	
0600	0700		USA, WEWN Birmingham AL	5850va	7570va
0600	0700		USA, WHRA Greenbush ME	7555na	
0600	0700	twhfa	USA, WHRI Cypress Creek SC		5860am
0600	0700		USA, WHRI Cypress Creek SC		7315am
			7490am		
0600	0700		USA, WMLK Bethel PA	9265eu	
0600	0700		USA, WRMI Miami FL	9955am	
0600	0700		USA, WTJC Newport NC	9370na	
0600	0700		USA, WWCR Nashville TN	3215na	5070na
			5765na 5935na		
0600	0700		USA, WWRB Manchester TN	3185na	5085na
0600	0700		USA, WYFR/Family R Okeechobee FL	5945am	
			6000am 7780va 9860na		11580af
			11630va		
0600	0700		Uzbekistan, Christian Vision	13685as	
0600	0700	vl	Vanuatu, Radio 4960do		
0600	0700		Yemen, Rep of Yemen Radio	9780me	
0600	0700		Zambia, Christian Voice	6065af	
0600	0700	vl	Zimbabwe, ZBC Corp	5975do	
0605	0620	m	Austria, Radio Austria Intl	17870me	
0605	0630	Sat/Sun	Austria, Radio Austria Intl	17870me	
0630	0656		Romania, Radio Romania Intl	7180va	9690va
			15135va 17780va		
0630	0700		Australia, Radio 9660as	12080as	13670as
			15160as 15240pa 15415as		15515as
			17750va		
0630	0700		UK, BBC World Service	11795af	
0630	0700		USA, Voice of America	6080af	9885af
			15580af		
0630	0700		Vatican City, Vatican Radio	7360af	9660af
			11625af		
0635	0700	Sat/Sun	Austria, Radio Austria Intl	17870me	

0645 0700 twhf Austria, Radio Austria Intl 17870me

0700 UTC - 2AM EST / 1AM CST / 11PM PST

0700	0705		Croatia, Croatian Radio	9470oc	11690oc
0700	0706		UK, BBC World Service	6005af	
0700	0730		Australia, CVC International	15515as	
0700	0730		Slovakia, Radio Slovakia Int	13715oc	15460oc
0700	0757	DRM	Netherlands, Radio	7300eu	
0700	0800		Anguilla, University Network	6090am	
0700	0800		Australia, ABC NT Alice Springs		2310do
			4835do		
0700	0800		Australia, ABC NT Katherine	5025do	
0700	0800		Australia, ABC NT Tennant Creek		4910do
0700	0800		Australia, CVC International	15335as	
0700	0800		Australia, Radio 9660as	9710as	12080as
			13630as 15160pa 15240pa		15415as
			17750va		
0700	0800		Canada, CFRX Toronto ON	6070na	
0700	0800		Canada, CFVP Calgary AB	6030na	
0700	0800		Canada, CKZN St John's NF	6160na	
0700	0800		Canada, CKZU Vancouver BC		6160na
0700	0800		China, China Radio Intl	11785eu	11880as
			13645as 15465as 17490eu		17540as
			17790as		
0700	0800		Costa Rica, University Network		5030va
			6150va 7375va 9725va		11870va
0700	0800		France, Radio France Intl	11725af	15605af
0700	0800		Germany, CVC The Voice Africa		9555af
0700	0800		Germany, CVC The Voice Africa		9555af
0700	0800		Germany, Deutsche Welle	6140eu	
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do
0700	0800		Guyana, Voice of 3291do		5950do
0700	0800		Liberia, ELWA	4760do	
0700	0800		Liberia, Star Radio	9525af	
0700	0800		Malaysia, RTM/Trax FM	7295as	
0700	0800		Malaysia, RTM/Voice of Malaysia		6175as
			9750as 15295as		
0700	0800		Myanmar, Radio 9730do		
0700	0800	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do 6175do		
0700	0800		New Zealand, Radio NZ Intl	9870pa	
0700	0800	DRM	New Zealand, Radio NZ Intl	9890pa	
0700	0800		Nigeria, Radio/Ibadan	6050do	
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do
0700	0800		Nigeria, Radio/Lagos	3326do	4990do
0700	0800	vl	Papua New Guinea, Wantok R. Light		7120va
0700	0800		Russia, Voice of 17665oc	17805oc	
0700	0800	DRM	Russia, Voice of 11635eu		
0700	0800	irreg/ vl	Sierra Leone, SLBS	3316do	
0700	0800		Singapore, MediaCorp Radio	6150do	
0700	0800	vl	Solomon Islands, SIBC	5020do	9545do
0700	0800	vl	South Africa, Channel Africa	9620af	
0700	0800	Sat/Sun	Swaziland, TWR 4775af		
0700	0800		Swaziland, TWR 6120af	9500af	
0700	0800		Taiwan, Radio Taiwan Intl	5950na	
0700	0800	mtwhf	UK, BBC World Service	15400af	
0700	0800		UK, BBC World Service	5875eu	6190af
			6195eu 7320eu 9410eu		11695as
			11760me 11765af 11795eu		11940af
			11955as 12095eu 15360as		15420af
			15575as 17790as		
0700	0800	Sat/Sun	UK, Bible Voice	5945eu	
0700	0800		USA, American Forces Radio	4319usb	5446usb
			5765usb 6350usb 7812usb		10320usb
			12133usb 13362usb 12579usb		
0700	0800		USA, KAIJ Dallas TX	5755na	
0700	0800		USA, KTBN Salt Lake City UT	7505na	
0700	0800		USA, KWHR Naalehu HI	11565as	13650as
0700	0800		USA, WBCQ Kennebunk ME	5110na	7415na
0700	0800		USA, WBOH Newport NC	5920am	
0700	0800		USA, WEWN Birmingham AL	5850va	7570va
0700	0800		USA, WHRA Greenbush ME	7465na	
0700	0800	twhfa	USA, WHRI Cypress Creek SC		5860am
0700	0800		USA, WHRI Cypress Creek SC		7315am
			7490am		
0700	0800		USA, WMLK Bethel PA	9265eu	
0700	0800		USA, WRMI Miami FL	9955am	
0700	0800		USA, WTJC Newport NC	9370na	
0700	0800		USA, WWCR Nashville TN	3215na	5070na
			5765na 5935na		
0700	0800		USA, WWRB Manchester TN	3185na	5085na
0700	0800		USA, WYFR/Family R Okeechobee FL	5945am	
			7455na 7780va 9495am		9715na
			9985af		
0700	0800	vl	Vanuatu, Radio 4960do		
0700	0800		Zambia, Christian Voice	6065af	
0730	0745	mtwhfa	Vatican City, Vatican Radio	4005eu	6185eu
			7250eu 9645eu 11740eu		15595va
0730	0800	mtwhfa	Australia, HCJB	11750pa	
0730	0800		Bulgaria, Radio 9500eu	11500eu	

0730 0800 Pakistan, Radio 15100eu 17835eu
0745 0800 s Albania, TWR Europe 11865eu
0745 0800 s Monaco, TWR Europe 9800eu

0800 UTC - 3AM EST / 2AM CST / 12AM PST

0800 0825	Malaysia, RTM/Voice of Malaysia	6175as	
	9750as 15295as		
0800 0827	Czech Rep, Radio Prague	7345eu	9860eu
0800 0830	Australia, ABC NT Katherine	5025do	
0800 0830	Australia, ABC NT Tennant Creek	4910do	
0800 0830	Liberia, ELWA	4760do	
0800 0830	Myanmar, Radio	9730do	
0800 0830	Pakistan, Radio	15100eu 17835eu	
0800 0845 a	Guam, TWR/KTWR	11840pa	
0800 0845 Sat/Sun	UK, Bible Voice	5945eu	
0800 0900 smtwhf	Albania, TWR Europe	11865eu	
0800 0900	Anguilla, University Network	6090am	
0800 0900	Australia, ABC NT Alice Springs	2310do	
	4835do		
0800 0900	Australia, CVC International	15335as	
0800 0900 mtwhfa	Australia, HCJB	11750pa	
0800 0900	Australia, Radio	5995va 9580va 9710va	
	12080as 13630va 15415as 17750va		
0800 0900	Canada, CFRX Toronto ON	6070na	
0800 0900	Canada, CFVP Calgary AB	6030na	
0800 0900	Canada, CKZN St John's NF	6160na	
0800 0900	Canada, CKZU Vancouver BC	6160na	
0800 0900	China, China Radio Intl	9415as 11785eu	
	11880as 15350as 15465as 17490eu		
	17540as		
0800 0900	Costa Rica, University Network	5030va	
	6150va 7375va 9725va 11870va		
0800 0900	Germany, CVC The Voice Africa	9555af	
0800 0900	Germany, Deutsche Welle	6140eu	
0800 0900 vl	Ghana, Ghana BC Corp	3366do	4915do
0800 0900 mtwhf	Guam, TWR/KTWR	11840pa	
0800 0900	Guyana, Voice of 3291do	5950do	
0800 0900	Indonesia, Voice of	9525as 11785pa	
	15150al		
0800 0900	Liberia, Star Radio	9525af	
0800 0900	Malaysia, RTM/Trax FM	7295as	
0800 0900 s	Monaco, TWR Europe	9800eu	
0800 0900 mtwhf	Monaco, TWR Europe	9800eu	
0800 0900	New Zealand, Radio NZ Intl	9870pa	
0800 0900 DRM	New Zealand, Radio NZ Intl	9890pa	
0800 0900	Nigeria, Radio/Ibadan	6050do	
0800 0900	Nigeria, Radio/Kaduna	4770do 6090do	
0800 0900	Nigeria, Radio/Lagos	3326do 4990do	
0800 0900	Papua New Guinea, Catholic Radio	4960do	
0800 0900	Papua New Guinea, NBC	4890do	
0800 0900 vl	Papua New Guinea, Wantok R. Light	7120va	
0800 0900	Russia, Voice of 15195as	17495oc	
	17805oc		
0800 0900 irreg/ vl	Sierra Leone, SLBS	3316do	
0800 0900	Singapore, MediaCorp Radio	6150do	
0800 0900 vl	Solomon Islands, SIBC	5020do 9545do	
0800 0900 vl	South Africa, Channel Africa	9620af	
0800 0900	South Korea, KBS World Radio	9570as	
	9640eu		
0800 0900	Swaziland, TWR	6120af 9500af	
0800 0900	Taiwan, Radio Taiwan Intl	9610as	
0800 0900	UK, BBC World Service	5875eu 6190af	
	6195eu 7320eu 9740as 11760va		
	11940af 12095eu 15285as 17790as		
	17885af 21470af 21660as		
0800 0900 mtwhf	UK, BBC World Service	15400af 17830af	
0800 0900 Sat/Sun	UK, BBC World Service	15575as 17830af	
0800 0900	USA, American Forces Radio	4319usb 5446usb	
	5765usb 6350usb 7812usb 10320usb		
	12133usb 13362usb 12579usb		
0800 0900	USA, KAIJ Dallas TX	5755na	
0800 0900	USA, KNLS Anchor Point AK	6150as	
0800 0900	USA, KTVN Salt Lake City UT	7505na	
0800 0900	USA, KWHR Naalehu HI	9930as 11565as	
0800 0900	USA, WBOH Newport NC	5920am	
0800 0900	USA, WEWN Birmingham AL	5850na	
0800 0900	USA, WHRA Greenbush ME	7465na	
0800 0900 twhfa	USA, WHRI Cypress Creek SC	5860am	
0800 0900	USA, WHRI Cypress Creek SC	7315 an	
	7490am		
0800 0900	USA, WMLK Bethel PA	9265eu	
0800 0900	USA, WRMI Miami FL	9955am	
0800 0900	USA, WTJC Newport NC	9370na	
0800 0900	USA, WWCR Nashville TN	3215na 5070na	
	5765na 5935na		
0800 0900	USA, WWRB Manchester TN	3185na 5085na	
0800 0900	USA, WYFR/Family R Okeechobee FL	5950na	
	6855na 7455na		
0800 0900 vl	Vanuatu, Radio	4960do	
0800 0900	Zambia, Christian Voice	6065af	

0805 0900 mtwhf	Guam, TWR/KTWR	15170as	
0815 0850 a	Albania, TWR Europe	11865eu	
0815 0850 a	Monaco, TWR Europe	9800eu	
0830 0900	Australia, ABC NT Katherine	2485do	
0830 0900	Australia, ABC NT Tennant Creek	2325do	

0900 UTC - 4AM EST / 3AM CST / 1AM PST

0900 0900	USA, WBCQ Kennebunk ME	5110na 7415na	
0900 0915 vl	Ghana, Ghana BC Corp	3366do 4915do	
0900 0920 smtwhf	Albania, TWR Europe	11865eu	
0900 0920 s	Monaco, TWR Europe	9800eu	
0900 0920 mtwhf	Monaco, TWR Europe	9800eu	
0900 0930 mtwhfa	Australia, HCJB	11750pa	
0900 1000	Anguilla, University Network	6090am	
0900 1000	Australia, ABC NT Alice Springs	2310do	
	4835do		
0900 1000	Australia, ABC NT Katherine	2485do	
0900 1000	Australia, ABC NT Tennant Creek	2325do	
0900 1000	Australia, CVC International	11955as	
0900 1000	Australia, Radio	9580va 15415as	
0900 1000	Bhutan, BBS	6035as	
0900 1000	Canada, CFRX Toronto ON	6070na	
0900 1000	Canada, CFVP Calgary AB	6030na	
0900 1000	Canada, CKZN St John's NF	6160na	
0900 1000	Canada, CKZU Vancouver BC	6160na	
0900 1000	China, China Radio Intl	9415as 15210as	
	15350as 17490eu 17690as 17750as		
0900 1000	Costa Rica, University Network	5030va	
	6150va 7375va 9725va 11870va		
	13750va		
0900 1000	Germany, CVC The Voice Africa	9555af	
0900 1000	Germany, Deutsche Welle	6140eu 17700as	
	21780eu		
0900 1000	Guyana, Voice of 3291do	5950do	
0900 1000 Sat/Sun	Italy, IRRS	9310eu 13840eu	
0900 1000	Malaysia, RTM/Trax FM	7295as	
0900 1000 vl	Namibia, Namibian BC Corp	3270do 3290do	
	6060do 6175do		
0900 1000	New Zealand, Radio NZ Intl	9870pa	
0900 1000 DRM	New Zealand, Radio NZ Intl	9890pa	
0900 1000	Nigeria, Radio/Ibadan	6050do	
0900 1000	Nigeria, Radio/Kaduna	4770do 6090do	
0900 1000	Nigeria, Radio/Lagos	3326do 4990do	
0900 1000	Papua New Guinea, Catholic Radio	4960do	
0900 1000	Papua New Guinea, NBC	4890do	
0900 1000 vl	Papua New Guinea, Wantok R. Light	7120va	
0900 1000	Russia, Voice of 17495oc	17665oc	
0900 1000 vl	Rwanda, Radio	6055do	
0900 1000 irreg/ vl	Sierra Leone, SLBS	3316do	
0900 1000	Singapore, MediaCorp Radio	6150do	
0900 1000 vl	Solomon Islands, SIBC	5020do 9545do	
0900 1000 vl	South Africa, Channel Africa	9620af	
0900 1000 mtwhf	UK, BBC World Service	15400af 15575as	
	17830af		
0900 1000	UK, BBC World Service	5975as 6190af	
	6195as 7320eu 9470eu 9740as		
	11760me 11940af 12095eu 15285as		
	15485eu 17760as 17790as 17885af		
	21470af 21660as		
0900 1000 Sat/Sun	UK, BBC World Service	15575as 17830af	
0900 1000 mtwhf	UK, BBC World Service	15400af 15575as	
	17830af		
0900 1000	USA, American Forces Radio	4319usb 5446usb	
	5765usb 6350usb 7812usb 10320usb		
	12133usb 13362usb 12579usb		
0900 1000	USA, KAIJ Dallas TX	5755na	
0900 1000	USA, KTVN Salt Lake City UT	7505na	
0900 1000	USA, KWHR Naalehu HI	9930as 11565as	
0900 1000	USA, WBCQ Kennebunk ME	5110na 7415na	
0900 1000	USA, WBOH Newport NC	5920am	
0900 1000	USA, WEWN Birmingham AL	5850na	
0900 1000	USA, WHRI Cypress Creek SC	7315am	
	7520am		
0900 1000	USA, WRMI Miami FL	9955am	
0900 1000	USA, WTJC Newport NC	9370na	
0900 1000	USA, WWCR Nashville TN	3215na 5070na	
	5765na 5935na		
0900 1000	USA, WWRB Manchester TN	3185na 5085na	
0900 1000	USA, WYFR/Family R Okeechobee FL	5950na	
	6885na 7455na		
0900 1000 vl	Vanuatu, Radio	4960do	
0900 1000	Zambia, Christian Voice	6065af	
0930 1000	Australia, HCJB	15360as	

1000 UTC - 5AM EST / 4AM CST / 2AM PST

1000 1027	Czech Rep, Radio Prague	9955am 15710as
	21745af	
1000 1030	Mongolia, Voice of	12085as

1000	1030	UK, BBC World Service	5975as	15285as
1000	1057	Netherlands, Radio 12065as	6040as	9795as
1000	1058	New Zealand, Radio NZ Intl	9870pa	
1000	1058	DRM New Zealand, Radio NZ Intl	9890pa	
1000	1100	Anguilla, University Network	11775am	
1000	1100	Australia, ABC NT Alice Springs	2310do	
		4835do		
1000	1100	Australia, ABC NT Katherine	2485do	
1000	1100	Australia, ABC NT Tennant Creek	2325do	
1000	1100	Australia, CVC International	11955as	
1000	1100	Australia, HCJB	15430as	
1000	1100	Australia, Radio 9580va	9590va	15415as
1000	1100	Canada, CFRX Toronto ON	6070na	
1000	1100	Canada, CFVP Calgary AB	6030na	
1000	1100	Canada, CKZN St John's NF	6160na	
1000	1100	Canada, CKZU Vancouver BC	6160na	
1000	1100	China, China Radio Intl	5955as	7135as
		7215as	13590as	13720as
		15210as	15350as	17490eu
		17750as		17690as
1000	1100	Costa Rica, University Network	5030va	
		6150va	7375va	9725va
		13750va		11870va
1000	1100	Germany, CVC The Voice Africa	9555af	
1000	1100	Guyana, Voice of 3291do	5950do	
1000	1100	India, All India Radio	13710oc	15020as
		15235as	17510pa	17800as
1000	1100	Italy, IRRS	9310eu	13840eu
1000	1100	Japan, Radio Japan/NHK World	6120na	
		9695as	11730as	17585va
		21755oc		17720me
1000	1100	Malaysia, RTM/Trax FM	7295as	
1000	1100	Nigeria, Voice of 15120af		
1000	1100	North Korea, Voice of Korea	6185as	6285am
		9850as		
1000	1100	Papua New Guinea, Catholic Radio	4960do	
1000	1100	Papua New Guinea, NBC	4890do	
1000	1100	vi Papua New Guinea, Wantok R. Light	7120va	
1000	1100	Singapore, MediaCorp Radio	6150do	
1000	1100	vi Solomon Islands, SIBC	5020do	9545do
1000	1100	vi South Africa, Channel Africa	9620af	
1000	1100	UK, BBC World Service	6190af	6195as
		7320eu	9470eu	9740as
		11940af	11945as	15485eu
		17640eu	17790as	17830af
				17885af
				21470af
1000	1100	UK, BBC World Service	17830af	
1000	1100	USA, American Forces Radio	4319usb	5446usb
		5765usb	6350usb	7812usb
		12133usb	13362usb	10320usb
				12579usb
1000	1100	USA, KAIJ Dallas TX	5755na	
1000	1100	USA, KNLS Anchor Point AK	6150as	
1000	1100	USA, KTBN Salt Lake City UT	7505na	
1000	1100	USA, KWHR Naalehu HI	9930as	11565as
1000	1100	USA, WBCQ Kennebunk ME	5110na	7415na
1000	1100	USA, WBOH Newport NC	5920am	
1000	1100	USA, WEWN Birmingham AL	5850na	
1000	1100	USA, WHRI Cypress Creek SC	7315am	
		7520am		
1000	1100	USA, WRMI Miami FL	9955am	
1000	1100	USA, WTJC Newport NC	9370na	
1000	1100	USA, WWCR Nashville TN	5070na	5765na
		5935na	9985na	
1000	1100	USA, WWRB Manchester TN	3185na	5085na
1000	1100	USA, WYFR/Family R Okeechobee FL	5950na	
		6855na	6890na	7455na
1000	1100	Zambia, Christian Voice	6065af	
1030	1045	mtwhf Ethiopia, Radio	5990af	7110af
1030	1045	Israel, Kol Israel	15760eu	17535eu
1030	1058	Vietnam, Voice of 7285as		
1030	1100	Australia, HCJB	15400as	
1030	1100	Iran, Voice of the Islamic Rep	15460as	17660as
1030	1100	UK, BBC World Service	9605as	11750as
		15285as	15545as	
1059	1100	New Zealand, Radio NZ Intl	13840pa	
1059	1100	DRM New Zealand, Radio NZ Intl	9890pa	

1100 UTC - 6AM EST / 5AM CST / 3AM PST

1100	1104	Pakistan, Radio	15100as	17835as
1100	1127	Iran, Voice of the Islamic Rep	15460as	17600as
1100	1128	Vietnam, Voice of 9840as	7220as	7285as
1100	1130	Australia, HCJB	15400as	
1100	1130	mtwhf UK, BBC World Service	6130am	
1100	1200	Anguilla, University Network	11775am	
1100	1200	Australia, ABC NT Alice Springs	2310do	
		4835do		
1100	1200	Australia, ABC NT Katherine	2485do	
1100	1200	Australia, ABC NT Tennant Creek	2325do	
1100	1200	Australia, CVC International	13635as	

1100	1200	Australia, Radio	5995va	6020va	9475as
		9560pa	9580va	9590va	12080as
1100	1200	Sat/Sun Canada, CBC NQ SW Service	9625na		
1100	1200	Canada, CFRX Toronto ON	6070na		
1100	1200	Canada, CFVP Calgary AB	6030na		
1100	1200	Canada, CKZN St John's NF	6160na		
1100	1200	Canada, CKZU Vancouver BC		6160na	
1100	1200	China, China Radio Intl	5955as	5956na	
		9570as	11650as	11795as	13590as
		13645as	13665eu	13720as	17490eu
1100	1200	Costa Rica, University Network	5030va		
		6150va	7375va	9725va	11870va
		13750va			
1100	1200	Germany, CVC The Voice Africa		9555af	
1100	1200	s Germany, Universal Life	6055me		
1100	1200	Sat/Sun Italy, IRRS	9310eu	13840eu	
1100	1200	Japan, Radio Japan/NHK World	6120na		
		9695as	11730as		
1100	1200	vi Libya, Voice of Africa	17725af	21695af	
1100	1200	Malaysia, RTM/Trax FM	7295as		
1100	1200	New Zealand, Radio NZ Intl	13840pa		
1100	1200	DRM New Zealand, Radio NZ Intl	9890pa		
1100	1200	Nigeria, Voice of 15120af			
1100	1200	Papua New Guinea, Catholic Radio	4960do		
1100	1200	Papua New Guinea, NBC	4890do		
1100	1200	vi Papua New Guinea, Wantok R. Light	7120va		
1100	1200	Singapore, Radio Singapore Intl	6080as		
		6150as			
1100	1200	vi South Africa, Channel Africa	9620af		
1100	1200	Taiwan, Radio Taiwan Intl	7445as		
1100	1200	Sat/Sun UK, BBC World Service	5875am	6130am	
1100	1200	UK, BBC World Service	6190af	6195as	
		7320eu	9470eu	9740as	11760me
		11940af	11945as	15485eu	15575as
		17640eu	17790as	17830af	17885af
					21470af
1100	1200	USA, American Forces Radio	4319usb	5446usb	
		5765usb	6350usb	7812usb	10320usb
		12133usb	13362usb	12579usb	
1100	1200	USA, KAIJ Dallas TX	5755na		
1100	1200	USA, KTBN Salt Lake City UT	7505na		
1100	1200	USA, KWHR Naalehu HI	9930as	11565as	
1100	1200	USA, WBOH Newport NC	5920am		
1100	1200	USA, WEWN Birmingham AL	5850na		
1100	1200	USA, WHRI Cypress Creek SC	5875am		
		7315am			
1100	1200	USA, WINB Red Lion PA	9265am		
1100	1200	USA, WRMI Miami FL	9955am		
1100	1200	USA, WTJC Newport NC	9370na		
1100	1200	USA, WWCR Nashville TN	5070na	5765na	
		5935na	15825na		
1100	1200	USA, WWRB Manchester TN	3185na	5085na	
1100	1200	USA, WYFR/Family R Okeechobee FL	5950na		
		6000am	7780na	11725am	11830na
1100	1200	Zambia, Christian Voice	6065af		
1105	1200	s Greece, Voice of 9420eu	17525eu		
1130	1145	UK, BBC World Service	7135as	11920as	
1130	1157	Czech Rep, Radio Prague	11640eu	17545va	
1130	1200	mtwhf Australia, HCJB	15430as		
1130	1200	a Germany, Universal Life	6055me		
1130	1200	Guam, AWR/KSDA	15260as		
1130	1200	mtwhf UK, BBC World Service	5875am	6130am	
1130	1200	Vatican City, Vatican Radio	15595va	17765va	
1157	1200	Greece, Macedonias Radio	9935eu		

1200 UTC - 7AM EST / 6AM CST / 4AM PST

1200	1230	France, Radio France Intl	15275af	17815af
		21620af		
1200	1230	UAE, AWR Africa	15110as	
1200	1257	Netherlands, Radio	11675na	
1200	1258	New Zealand, Radio NZ Intl	13840pa	
1200	1258	DRM New Zealand, Radio NZ Intl	9890pa	
1200	1259	Canada, Radio Canada Intl	7105as	9665as
1200	1300	Anguilla, University Network	11775am	
1200	1300	Australia, ABC NT Alice Springs	2310do	
		4835do		
1200	1300	Australia, ABC NT Katherine	2485do	
1200	1300	Australia, ABC NT Tennant Creek	2325do	
1200	1300	Australia, CVC International	13635as	
1200	1300	Australia, Radio 5995va	6020va	9475as
		9560pa	9580va	9590va
1200	1300	Sat/Sun Canada, CBC NQ SW Service	9625na	
1200	1300	Canada, CFRX Toronto ON	6070na	
1200	1300	Canada, CFVP Calgary AB	6030na	
1200	1300	Canada, CKZN St John's NF	6160na	
1200	1300	Canada, CKZU Vancouver BC		6160na
1200	1300	China, China Radio Intl	5955as	7250as
		9460as	9730as	9760as
		11690as	11980as	12080as
		13790eu	17490eu	13655eu

1200	1300	Costa Rica, University Network	9725va	
		11870va 13750va		
1200	1300	Germany, CVC International	13830as	15715me
1200	1300	Germany, CVC The Voice Africa		9555af
1200	1300	Italy, IRRS	9310af	13840eu
1200	1300	Italy, IRRS	15750va	
1200	1300	Libya, Voice of Africa	17625af	17660af
1200	1300		17670af 17675af	17680af
1200	1300	Malaysia, RTM/Trax FM	7295as	
1200	1300	Nigeria, Voice of	15120af	
1200	1300	Papua New Guinea, Catholic Radio		4960do
1200	1300	Papua New Guinea, NBC	4890do	
1200	1300	Papua New Guinea, Wantok R. Light		7120va
1200	1300	Singapore, Radio Singapore Intl	6080as	
		6150as		
1200	1300	South Africa, Channel Africa	9620af	
1200	1300	South Korea, KBS World Radio		9650na
1200	1300	Taiwan, Radio Taiwan Intl	7130am	
1200	1300	UK, BBC World Service	5975as	6190af
		6195as 7320eu	9470eu	9660am
		9740as 9750am	11760me	11895as
		11940as 15310as	15485eu	15575as
		17640eu 17790as	17830af	17885af
		21470af		
1200	1300	Ukraine, Radio Ukraine Intl	9925eu	
1200	1300	USA, American Forces Radio	4319usb	5446usb
		5765usb 6350usb	7812usb	10320usb
		12133usb 13362usb	12579usb	
1200	1300	USA, KAIJ Dallas TX	5755na	
1200	1300	USA, KNLS Anchor Point AK	6150as	6915as
1200	1300	USA, KTNB Salt Lake City UT	7505na	
1200	1300	USA, KWHR Naalehu HI	11565as	12130as
1200	1300	USA, Voice of America	9645va	9760va
		11705va 11730va	15190va	
1200	1300	USA, WBOH Newport NC	5920am	
1200	1300	USA, WEWN Birmingham AL	9955na	
1200	1300	USA, WHRA Greenbush ME	15665na	
1200	1300	USA, WHRI Cypress Creek SC		7520am
		9660am		
1200	1300	USA, WINB Red Lion PA	9265am	
1200	1300	USA, WRMI Miami FL	9955am	
1200	1300	USA, WTJC Newport NC	9370na	
1200	1300	USA, WWCN Nashville TN	5070na	5765na
		5935na 15825na		
1200	1300	USA, WWRB Manchester TN	9385na	
1200	1300	USA, WYFR/Family R Okeechobee FL		6890na
		7780na 11530am		
1200	1300	Zambia, Christian Voice	6065af	
1215	1300	Egypt, Radio Cairo	17835as	
1230	1258	Vietnam, Voice of	9840as	12020as
1230	1300	Bangladesh, Bangla Betar	7185as	
1230	1300	Bulgaria, Radio	11700eu	15700eu
1230	1300	Thailand, Radio	9835oc	
1245	1300	Australia, HCJB	15430as	
1255	1258	Finland, YLE/Radio Finland	13715do	15400do
1259	1300	New Zealand, Radio NZ Intl	7145pa	
1259	1300	New Zealand, Radio NZ Intl	5950pa	

1300 UTC - 8AM EST / 7AM CST / 5AM PST

1300	1330	Egypt, Radio Cairo	17835as	
1300	1330	Italy, IRRS	15750as	
1300	1356	Romania, Radio Romania Intl	15105eu	17745eu
1300	1359	Poland, Radio Polonia	5975eu	9525eu
1300	1400	Anguilla, University Network	11775am	
1300	1400	Australia, CVC International	13635as	
1300	1400	Australia, Radio	5995va	9560as
		9580va 9590va		
1300	1400	Canada, CBC NQ SW Service	9625na	
1300	1400	Canada, CFRX Toronto ON	6070na	
1300	1400	Canada, CFVP Calgary AB	6030na	
1300	1400	Canada, CKZN St John's NF	6160na	
1300	1400	Canada, CKZU Vancouver BC		6160na
		China, China Radio Intl	5955as	7300as
		9570na 9655as	9730as	9765as
		9870as 11760as	11885na	11900as
		11980as 13610eu	13790eu	15230na
1300	1400	Costa Rica, University Network		9725va
		11870va 13750va		
1300	1400	Germany, CVC International	13830as	15715me
1300	1400	Germany, CVC The Voice Africa		9555af
1300	1400	Germany, Deutsche Welle	6140eu	
1300	1400	Germany, Overcomer Ministries		6110eu
1300	1400	Libya, Voice of Africa	17625af	17660af
		17670af 17675af	17680af	
1300	1400	Malaysia, RTM/Trax FM	7295as	
1300	1400	New Zealand, Radio NZ Intl	7145pa	
1300	1400	New Zealand, Radio NZ Intl	5950pa	
1300	1400	Nigeria, Voice of	15120af	
1300	1400	North Korea, Voice of Korea	7570eu	9335na
		11710na 12015eu		

1300	1400	Papua New Guinea, Catholic Radio		4960do
1300	1400	Papua New Guinea, NBC	4890do	
1300	1400	Papua New Guinea, Wantok R. Light		7120va
1300	1400	Singapore, Radio Singapore Intl		6080as
		6150as		
1300	1400	South Africa, Channel Africa	9620af	
1300	1400	South Korea, KBS World Radio		9570na
		9770as		
1300	1400	UK, BBC World Service	5975as	6190af
		6195as 7320eu	9470eu	9740as
		11760me 11895as	11940af	15310as
		15420af 15485as	15575as	17640eu
		17790af 17830af	17885af	21470af
1300	1400	USA, American Forces Radio	4319usb	5446usb
		5765usb 6350usb	7812usb	10320usb
		12133usb 13362usb	12579usb	
1300	1400	USA, KAIJ Dallas TX	5755na	
1300	1400	USA, KTNB Salt Lake City UT	7505na	
1300	1400	USA, KWHR Naalehu HI	12130as	
1300	1400	USA, Voice of America	9645va	9760va
		11705va		
1300	1400	USA, WBCQ Kennebunk ME	9330na	
1300	1400	USA, WBOH Newport NC	5920am	
1300	1400	USA, WEWN Birmingham AL	9955na	
1300	1400	USA, WHRA Greenbush ME	15665na	
1300	1400	USA, WHRI Cypress Creek SC		6095am
1300	1400	USA, WHRI Cypress Creek SC		11785am
1300	1400	USA, WINB Red Lion PA	13570am	
1300	1400	USA, WRMI Miami FL	7385na	
1300	1400	USA, WTJC Newport NC	9370na	
1300	1400	USA, WWCN Nashville TN	7465na	9985na
		13845na 15825na		
1300	1400	USA, WWRB Manchester TN	9385na	
1300	1400	USA, WYFR/Family R Okeechobee FL		7680as
		11560as 11855na	11970na	
1300	1400	Zambia, Christian Voice	6065af	
1305	1320	Austria, Radio Austria Intl	6155va	13730va
		17855va		
1305	1330	Austria, Radio Austria Intl	6155me	13730va
		17855va		
1315	1330	Austria, Radio Austria Intl	17855va	
1330	1357	Czech Rep, Radio Prague	6065na	
1330	1400	Guam, AWR/KSDA	15260as	
1330	1400	India, All India Radio	9690as	11620as
		13710as		
1330	1400	Laos, National Radio	7145as	
1330	1400	Sweden, Radio	7420va	11550va
1330	1400	Sweden, Radio	7275eu	15240va
1330	1400	Turkey, Voice of	11735as	12035eu
1335	1400	Austria, Radio Austria Intl	6155va	13730va
		17855va		
1345	1400	Austria, Radio Austria Intl	6155va	13730va
		17855va		

1400 UTC - 9AM EST / 8AM CST / 6AM PST

1400	1415	Germany, Pan American BC	15205me	
1400	1415	Seychelles, FEBA	7190as	
1400	1427	Czech Rep, Radio Prague	11600as	13580na
1400	1427	Czech Rep, Radio Prague	9750na	
1400	1430	Australia, Radio	5995va	6080va
		9590va		7240as
1400	1430	Guam, TWR/KTWR		9975as
1400	1430	Thailand, Radio	9830oc	
1400	1430	Turkey, Voice of	11735as	12035eu
1400	1430	UK, BBC World Service		9470eu
1400	1500	Anguilla, University Network	11775am	
1400	1500	Australia, CVC International	13635as	
1400	1500	Bhutan, BBS	6035as	
1400	1500	Canada, CBC NQ SW Service	9625na	
1400	1500	Canada, CFRX Toronto ON	6070na	
1400	1500	Canada, CFVP Calgary AB	6030na	
1400	1500	Canada, CKZN St John's NF	6160na	
1400	1500	Canada, CKZU Vancouver BC		6160na
1400	1500	Canada, Radio Canada Intl	9515am	13655am
		17820am		
1400	1500	China, China Radio Intl	5955as	7300as
		9460as 9700eu	9765as	9795eu
		9870as 13675na	13685af	13740na
		15230na 17630af		
1400	1500	Costa Rica, University Network		9725va
		11870va 13750va		
1400	1500	France, Radio France Intl	5920as	7180as
		9580af 15615af		
1400	1500	Germany, CVC International	13830as	15715me
1400	1500	Germany, CVC The Voice Africa		9555af
1400	1500	Germany, Deutsche Welle	6140eu	
1400	1500	Germany, Overcomer Ministries		6110eu
		13810va		
1400	1500	Greece, Voice of	9420eu	17525eu
1400	1500	Guam, TWR/KTWR		9975as

1400	1500	India, All India Radio	9690as	11620as
		13710as		
1400	1500	Japan, Radio Japan/NHK World	7200as	
		9875as 11840oc		
1400	1500	Jordan, Radio	11690na	
1400	1500	Libya, Voice of Africa	17660af	17725af
		17850af		
1400	1500	Malaysia, RTM/Trax FM	7295as	
1400	1500	Netherlands, Radio	9345as	12080as
		15595as		
1400	1500	DRM New Zealand, Radio NZ Intl	7145pa	
1400	1500	New Zealand, Radio NZ Intl	5950pa	
1400	1500	Nigeria, Voice of	15120af	
1400	1500	Oman, Radio Oman	15140as	
1400	1500	vi Papua New Guinea, Wantok R. Light	7120va	
1400	1500	Singapore, MediaCorp Radio	6150do	
1400	1500	vi South Africa, Channel Africa	9620af	
1400	1500	Taiwan, Radio Taiwan Intl	15265as	
1400	1500	UK, BBC World Service	5975as	6190af
		6195as 7320eu 9410eu 9740as		
		11760as 11895as 11920as 11940af		
		12095eu 15485eu 17830af 17885af		
		21470af		
1400	1500	Sat/Sun UK, Bible Voice	15690as	
1400	1500	USA, American Forces Radio	4319usb	5446usb
		5765usb 6350usb 7812usb 10320usb		
		12133usb 13362usb 12579usb		
1400	1500	USA, KAIJ Dallas TX	13815na	
1400	1500	USA, KJES Vado NM	11715na	
1400	1500	USA, KNLS Anchor Point AK	6150as	
1400	1500	USA, KTBN Salt Lake City UT	7505na	15590na
1400	1500	USA, KWHR Naalehu HI	9930as	
1400	1500	USA, Voice of America	4930af	6080af
		7125va 9695va 11655va 11885va		
		12150va 15205va 15580af 17895af		
1400	1500	USA, WBCQ Kennebunk ME	9330na	
1400	1500	USA, WBOH Newport NC	5920am	
1400	1500	USA, WEWN Birmingham AL	9955na	
1400	1500	USA, WHRA Greenbush ME	15665na	
1400	1500	USA, WHRI Cypress Creek SC	9840am	6095am
1400	1500	Sat/Sun USA, WHRI Cypress Creek SC		11795am
1400	1500	USA, WINB Red Lion PA	13570am	
1400	1500	USA, WRMI Miami FL	7385na	
1400	1500	USA, WTJC Newport NC	9370na	
1400	1500	USA, WWCR Nashville TN	7465na	9985na
		13845na 15825na		
1400	1500	USA, WWRB Manchester TN	9385na	
1400	1500	USA, WYFR/Family R Okeechobee FL	7580as	
		11560as 11565na 11855na 13695na		
		17760na		
1400	1500	Zambia, Christian Voice	6065af	
1415	1430	Nepal, Radio	3230as	5005as 6100as
		7165as		
1430	1445	s Germany, Pan American BC	15205as	15650as
1430	1459	DRM Canada, Radio Canada Intl	7240eu	
1430	1500	Australia, Radio	5995va 6080va 7240as	
		9475as 9590va 11660pa		
1430	1500	Myanmar, Radio	5986as	
1430	1500	DRM South Korea, KBS World Radio		9770eu
1430	1500	Sweden, Radio	11550va	15240va
1430	1500	UK, BBC World Service	7465eu	

1500 UTC - 10AM EST / 9AM CST / 7AM PST

1500	1510	mtwhfa	Turkmenistan, Turkmen Radio	5015eu	
1500	1527		Czech Rep, Radio Prague	7385na	15160na
1500	1528		Vietnam, Voice of	9550va	9840va 12020va
			13860va		
1500	1530		Guam, AWR/KSDA	12105as	
1500	1530		Mongolia, Voice of	12015eu	
1500	1530		UK, BBC World Service	11860af	15420af
			17885af		
1500	1530	fs	UK, Bible Voice	13840as	
1500	1530		USA, Voice of America	7175va	9760va
			15460va		
1500	1545		Germany, CVC The Voice Africa	9555af	
1500	1545		Seychelles, FEBA	7340as	
1500	1545		Sweden, IBRA Radio	7340as	
1500	1557		Canada, Radio Canada Intl	9635as	11870as
			11975as		
1500	1557		Libya, Voice of Africa	17660af	17725af
			17850af		
1500	1557		Netherlands, Radio	9345as	12080as
			15595as		
1500	1559		Germany, Deutsche Welle	6140eu	
1500	1600		Anguilla, University Network	11775am	
1500	1600		Australia, CVC International	13635as	
1500	1600		Australia, Radio	5995va 6080va 7240as	
			9475as 9590va		
1500	1600	Sat/Sun	Canada, CBC NQ SW Service	9625na	

1500	1600		Canada, CFRX Toronto ON	6070na	
1500	1600		Canada, CFVP Calgary AB	6030na	
1500	1600		Canada, CKZN St John's NF	6160na	
1500	1600		Canada, CKZU Vancouver BC		6160na
1500	1600	mtwhfa	Canada, Radio Canada Intl	9515am	13655am
			17820am		
1500	1600		China, China Radio Intl	5955as	7160as
			7325as 9435eu 9525eu 9785as		
			9870as 13685af 13740na		13630af
					9725va
1500	1600		Costa Rica, University Network		
			11870va 13750va		
1500	1600		Germany, CVC International	11705as	11830me
1500	1600		Germany, Overcomer Ministries		13810va
1500	1600	s	Germany, Overcomer Ministries		17815na
1500	1600	s	Italy, IRRS	9310eu	
1500	1600		Japan, Radio Japan/NHK World		6190as
			7200as 9505va 9875as		
1500	1600		Jordan, Radio	11690na	
1500	1600		Malaysia, RTM/Trax FM	7295as	
1500	1600	DRM	New Zealand, Radio NZ Intl	7145pa	
1500	1600		New Zealand, Radio NZ Intl	5950pa	
1500	1600		North Korea, Voice of Korea	7570eu	9335na
			11710na 12015eu		
1500	1600	vi	Papua New Guinea, Wantok R. Light		7120va
1500	1600		Russia, Voice of	7260as	7350as
1500	1600	DRM	Russia, Voice of	5905eu	5920eu
1500	1600		Singapore, MediaCorp Radio	6150do	
1500	1600	vi	South Africa, Channel Africa	9620af	
1500	1600		South Africa, Channel Africa	17770af	
1500	1600		UK, BBC World Service	5875eu	5965as
			5975as 6190af 6195as 7465eu		
			9410eu 9740as 9810as 11820eu		
			11920as 11940af 12095eu 15105af		
			15400af 17830af 21470af		
1500	1600	a	UK, Bible Voice	15680as	
1500	1600	vi/ mtwhf	UK, Sudan Radio Service	15575af	
1500	1600		USA, American Forces Radio	4319usb	5446usb
			5765usb 6350usb 7812usb 10320usb		
			12133usb 13362usb 12579usb		
1500	1600		USA, KAIJ Dallas TX	13815na	
1500	1600		USA, KJES Vado NM	11715na	
1500	1600		USA, KTBN Salt Lake City UT	7505na	15590na
1500	1600		USA, KWHR Naalehu HI	9930as	
1500	1600		USA, Voice of America	4930af	6080af
			7125va 9645va 11890va 12150va		
			13735va 15205va 15580af 17895af		
1500	1600		USA, WBCQ Kennebunk ME	9330na	
1500	1600		USA, WBOH Newport NC	5920am	
1500	1600		USA, WEWN Birmingham AL	9450na	
1500	1600		USA, WHRA Greenbush ME	15665na	
1500	1600		USA, WHRI Cypress Creek SC	9840am	
			11795am 13760am		
1500	1600		USA, WINB Red Lion PA	13570am	
1500	1600		USA, WRMI Miami FL	9955na	
1500	1600		USA, WTJC Newport NC	9370na	
1500	1600		USA, WWCR Nashville TN	9985na	12160na
			13845na 15825na		
1500	1600		USA, WWRB Manchester TN	9385na	
1500	1600		USA, WYFR/Family R Okeechobee FL	6280as	
			11855na 12015as 15210na		
1500	1600		Zambia, Christian Voice	4965af	
1500	1600	f DRM	Taiwan, Radio Taiwan Intl	9770eu	
1515	1530		Vatican City, Vatican Radio	11850va	13765va
1530	1545		India, All India Radio	9425as	
1530	1600		Bangladesh, Bangla Betar	4750as	
1530	1600		Iran, Voice of the Islamic Rep	6160as	7330as
1530	1600		UAE, AWR Africa	9530as	
1530	1600		USA, Voice of America	6110va	7175va
			9760va 15460va		
1530	1600		Vatican City, Vatican Radio	9310va	11850va
			13795va		
1540	1600	mtwhf	UK, Bible Voice	13590me	
1545	1600	s	Germany, Pan American BC	15650me	
1545	1600	a	UK, Bible Voice	13590me	

1600 UTC - 11AM EST / 10AM CST / 8AM PST

1600	1615		Pakistan, Radio	6215va	7530va 11570va
1600	1615	mtwhf	UK, Bible Voice	13590me	
1600	1620	mtwh	Moldova, Radio DMR Pridnestrovy		6235eu
1600	1627		Iran, Voice of the Islamic Rep	6160as	7330as
1600	1628	s	Hungary, Radio Budapest	6025eu	9565eu
1600	1628		Vietnam, Voice of	7280va	9550va 9730va
			11630va 13860va		
1600	1630	s h	Germany, Pan American BC	15650me	
1600	1630		Guam, AWR/KSDA	9585as	12065as
1600	1630		Myanmar, Radio	9730do	
1600	1630	Sat/Sun	Swaziland, TWR	6070af	
1600	1630		USA, Voice of America	11890va	15205va
1600	1640	f	Moldova, Radio DMR Pridnestrovy		6235eu
1600	1658		Germany, Deutsche Welle	6170as	9795as

1600	1659	mtwhfa	11695as Canada, Radio Canada Intl	9515am	13655am
1600	1700		17820am Anguilla, University Network	11775am	
1600	1700		Australia, CVC International	13635as	
1600	1700		Australia, Radio	5995va 6080va	7240as
1600	1700		9475as 9710va	11660pa	
1600	1700	a	Canada, CBC NQ SW Service	9625na	
1600	1700		Canada, CFRX Toronto ON	6070na	
1600	1700		Canada, CFVP Calgary AB	6030na	
1600	1700		Canada, CKZN St John's NF	6160na	
1600	1700		Canada, CKZU Vancouver BC	6160na	
1600	1700		China, China Radio Intl	7150af 7255eu	
1600	1700		9435eu 9525eu	9570af	
1600	1700		Costa Rica, University Network	11870va	
1600	1700		13750va		
1600	1700		Egypt, Radio Cairo	11740af	
1600	1700		Ethiopia, Radio	5990af 7110af	7165af
1600	1700		9560af 9704af		
1600	1700		France, Radio France Intl	7170af 9730af	
1600	1700		11615af 15160af		
1600	1700		Germany, CVC International	11705as	11830me
1600	1700	s	Germany, Overcomer Ministries	17815na	
1600	1700		Jordan, Radio	11690na	
1600	1700		Malaysia, RTM/Trax FM	7295as	
1600	1700	DRM	New Zealand, Radio NZ Intl	7145pa	
1600	1700		New Zealand, Radio NZ Intl	5950pa	
1600	1700		North Korea, Voice of Korea	9990va	11545af
1600	1700	vl	Papua New Guinea, Wantok R. Light	7120va	
1600	1700		Russia, Voice of	4965as 4975as	6130eu
1600	1700		7260eu 7305as	7320eu	
1600	1700		Taiwan, Radio Taiwan Intl	9785sa	11550as
1600	1700		UK, BBC World Service	3255af 3915af	
1600	1700		5875eu 5975as	6190af 6195as	
1600	1700		7465eu 9410eu	9740as 11665eu	
1600	1700		11820eu 11920as	12095eu 15105af	
1600	1700		15400af 21470af		
1600	1700	vl/ mtwhf	UK, Sudan Radio Service	15575af	
1600	1700		USA, American Forces Radio	4319usb 5446usb	
1600	1700		5765usb 6350usb	7812usb 10320usb	
1600	1700		12133usb 13362usb	12579usb	
1600	1700		USA, KAIJ Dallas TX	13815na	
1600	1700		USA, KJES Vado NM	11715na	
1600	1700		USA, KTBN Salt Lake City UT	15590na	
1600	1700		USA, KWHR Naalehu HI	9930as	
1600	1700		USA, Voice of America	4930af 6080af	
1600	1700		13600va 13795af	15445va 15580af	
1600	1700		17640va 17715af	17805af 17895af	
1600	1700		USA, WBCQ Kennebunk ME	9330na	
1600	1700		USA, WBOH Newport NC	5920am	
1600	1700		USA, WEWN Birmingham AL	9450va	15785va
1600	1700		USA, WHRA Greenbush ME	17650na	
1600	1700		USA, WHRI Cypress Creek SC	9840am	
1600	1700		15285am		
1600	1700	smtwhf	USA, WINB Red Lion PA	13570am	
1600	1700		USA, WMLK Bethel PA	9265eu	
1600	1700		USA, WRMI Miami FL	9955am	
1600	1700		USA, WTJC Newport NC	9370na	
1600	1700		USA, WWCR Nashville TN	9985na 12160na	
1600	1700		13845na 15825na		
1600	1700		USA, WWRB Manchester TN	9385na 15250na	
1600	1700		USA, WYFR/Family R Okeechobee FL	6085am 17690af	
1600	1700		11830na 12010as	13695na 17690af	
1600	1700		17760na 18980va	21455va	
1600	1700		Zambia, Christian Voice	4965af	
1605	1620	m	Austria, Radio Austria Intl	13675na	
1605	1630	Sat/Sun	Austria, Radio Austria Intl	13675na	
1615	1630	twhf	Austria, Radio Austria Intl	13775na	
1615	1700	Sat/Sun	UK, BBC World Service	11860af 15420af	
1630	1645	h	17885af		
1630	1659		UK, Bible Voice	13590me	
1630	1700	Sat/Sun	Swaziland, TWR	6070af	
1630	1700	mtwhf	Swaziland, TWR	6130af	
1630	1700	Sat/Sun	UK, BBC World Service	15420af	
1630	1700	Sat/Sun	UK, Bible Voice	9430me	
1635	1700	Sat/Sun	Austria, Radio Austria Intl	134675na	
1640	1650	mtwhfa	Turkmenistan, Turkmen Radio	4930eu	
1645	1530	twhf	Austria, Radio Austria Intl	13775na	
1645	1700	m	Austria, Radio Austria Intl	13675na	
1645	1700	mtwhf	Swaziland, TWR	6130af	
1645	1700	f	Sweden, IBRA Radio	7250as	
1645	1700		Tajikistan, Tajik Radio	7245as	
1645	1700	t	UK, Bible Voice	13590me	

1700 UTC - 12PM EST / 11AM CST / 9AM PST

1700	1715	mtwhf	Swaziland, TWR	6130af	
1700	1720		Moldova, Radio DMR Pridnestrovye	6235eu	
1700	1727		Czech Rep, Radio Prague	5930eu	15710af
1700	1730		Jordan, Radio	11690na	
1700	1745		UK, BBC World Service	6005af	9630af

1700	1750		New Zealand, Radio NZ Intl	5950pa	
1700	1750	DRM	New Zealand, Radio NZ Intl	7145pa	
1700	1800		Anguilla, University Network	11775am	
1700	1800		Australia, CVC International	13635as	
1700	1800		Australia, Radio	5995va 6080va	7240as
1700	1800		9475as 9580va	9710va 11660pa	
1700	1800	a	Canada, CBC NQ SW Service	9625na	
1700	1800		Canada, CFRX Toronto ON	6070na	
1700	1800		Canada, CFVP Calgary AB	6030na	
1700	1800		Canada, CKZN St John's NF	6160na	
1700	1800		Canada, CKZU Vancouver BC	6160na	
1700	1800		China, China Radio Intl	7150af 7205eu	
1700	1800		7255eu 9570af		
1700	1800		Costa Rica, University Network	11870va	
1700	1800		13750va		
1700	1800		Egypt, Radio Cairo	11740af	
1700	1800	fs	Italy, IRRS	9310va	
1700	1800		Japan, Radio Japan/NHK World	9535va	
1700	1800		11970eu 15355af		
1700	1800	DRM	Japan, Radio Japan/NHK World	9770eu	
1700	1800		Malaysia, RTM/Trax FM	7295as	
1700	1800		Nigeria, Voice of	15120af	
1700	1800	vl	Papua New Guinea, Wantok R. Light	7120va	
1700	1800		Russia, Voice of	6125as 7125va	7270va
1700	1800		7320eu 9470me		
1700	1800		South Africa, Channel Africa	15235af	
1700	1800		Swaziland, TWR	3200af	
1700	1800		Taiwan, Radio Taiwan Intl	11850af	
1700	1800		UK, BBC World Service	3255af 3915as	
1700	1800		5875eu 5975as	6190af 6195eu	
1700	1800		7465eu 9410eu	9740as 11665eu	
1700	1800		11955as 12095af	15400af 21470af	
1700	1800	Sat/Sun	UK, Bible Voice	9430me	
1700	1800	vl/ mtwhf	UK, Sudan Radio Service	11705af	
1700	1800		USA, American Forces Radio	4319usb 5446usb	
1700	1800		5765usb 6350usb	7812usb 10320usb	
1700	1800		12133usb 13362usb	12579usb	
1700	1800		USA, KAIJ Dallas TX	13815na	
1700	1800		USA, KTBN Salt Lake City UT	15590na	
1700	1800		USA, KWHR Naalehu HI	9930as	
1700	1800		USA, Voice of America	6080af 13710af	
1700	1800		15580af		
1700	1800	Sat/Sun	USA, Voice of America	4930af	
1700	1800		USA, WBCQ Kennebunk ME	9330na 18910na	
1700	1800		USA, WBOH Newport NC	5920am	
1700	1800		USA, WEWN Birmingham AL	9450va	15785va
1700	1800		USA, WHRA Greenbush ME	17650na	
1700	1800		USA, WHRI Cypress Creek SC	9840am	
1700	1800		15285am 15650am		
1700	1800		USA, WINB Red Lion PA	13570am	
1700	1800	smtwhf	USA, WMLK Bethel PA	9265eu	
1700	1800		USA, WRMI Miami FL	9955am	
1700	1800		USA, WTJC Newport NC	9370na	
1700	1800		USA, WWCR Nashville TN	9985na 12160na	
1700	1800		13845na 15825na		
1700	1800		USA, WWRB Manchester TN	9385na 15250na	
1700	1800		USA, WYFR/Family R Okeechobee FL	13695na	
1700	1800		17555na 21680na		
1700	1800		Zambia, Christian Voice	4965af	
1715	1730		Vatican City, Vatican Radio	4005eu 7250eu	
1730	1745	mtwhf	9635eu 9645eu		
1730	1745		UK, United Nations Radio	7170af 9565me	
1730	1745		17810af		
1730	1800		Guam, AWR/KSDA	9980me	
1730	1800		Liberia, ELWA	4760do	
1730	1800		Philippines, Radio Pilipinas	11720va 15190va	
1730	1800		17720va		
1730	1800		Slovakia, Radio Slovakia Int	5915eu 6055eu	
1730	1800		Swaziland, TWR	9500af	
1730	1800	f	UK, Bible Voice	13590me	
1730	1800		USA, Voice of America	4930af 11815af	
1730	1800		Vatican City, Vatican Radio	9755af 11625af	
1730	1800		13795af		
1730	1800	mtwhf	YSA, Voice of America	17730af	
1745	1800		India, All India Radio	7410eu 9445af	
1745	1800		9950eu 11620eu	11935af 13605af	
1745	1800		15075af 15155af	17670af	
1751	1800		New Zealand, Radio NZ Intl	9870pa	
1751	1800	DRM	New Zealand, Radio NZ Intl	11675pa	

1800 UTC - 1PM EST / 12PM CST / 10AM PST

1800	1815	a	UK, Bible Voice	11710me	
1800	1827		Czech Rep, Radio Prague	5930eu 9400va	
1800	1828		Vietnam, Voice of	5955eu 7280va	9730va
1800	1830		South Africa, AWR Africa	3215af 3345af	
1800	1830		11830af		
1800	1830		UK, BBC World Service	9740as	
1800	1830	a	UK, Bible Voice	13590me	
1800	1830	Sat/Sun	USA, Voice of America	4930af	

1800 1830	USA, Voice of America	6080af	11975af
	13710af	15580af	17895af
1800 1850	New Zealand, Radio NZ Intl	9870pa	
1800 1850	DRM New Zealand, Radio NZ Intl	11675pa	
1800 1856	Romania, Radio Romania Intl	7120eu	9640eu
1800 1857	Netherlands, Radio	6020af	7395af
	9895af	11655af	
1800 1859	Canada, Radio Canada Intl	7185af	11875af
	13650af	15365af	17740af
1800 1859	Poland, Radio Polonia	6015eu	7130eu
1800 1900	Anguilla, University Network	11775am	
1800 1900	mtwhf Argentina, RAE	9690eu	15345eu
1800 1900	Australia, Radio	6080va	7240as
	9500as	9580va	9710va
			11880pa
1800 1900	Canada, CFRX Toronto ON	6070na	
1800 1900	Canada, CFVP Calgary AB	6030na	
1800 1900	Canada, CKZN St John's NF	6160na	
1800 1900	Canada, CKZU Vancouver BC		6160na
1800 1900	China, China Radio Intl	6100eu	7100eu
1800 1900	Costa Rica, University Network		11870va
	13750va		
1800 1900	Germany, Overcomer Ministries		13855af
1800 1900	India, All India Radio	7410eu	9445af
	9950eu	11620eu	11935af
		15075af	15155af
			17670af
1800 1900	fs Italy, IRRS	9310va	
1800 1900	Liberia, ELWA	4760do	
1800 1900	Malaysia, RTM/Trax FM		7295as
1800 1900	North Korea, Voice of Korea	7570eu	12015eu
1800 1900	vi Papua New Guinea, Wantok R. Light		7120va
1800 1900	Philippines, Radio Pilipinas	11720va	15190va
	17720va		
1800 1900	Russia, Voice of	6125as	7105eu
	7270va	7295as	7320eu
			11510af
1800 1900	Sat/Sun Russia, Voice of	6055eu	6175eu
1800 1900	Swaziland, TWR	3200af	9500af
1800 1900	Taiwan, Radio Taiwan Intl		3965eu
1800 1900	UK, BBC World Service	3255af	5875eu
	5955as	5970eu	6190af
			6195eu
		7465eu	9410eu
			11955as
		15400af	17830af
			21470af
1800 1900	fs UK, Bible Voice	9430me	
1800 1900	USA, American Forces Radio	4319usb	5446usb
	5765usb	6350usb	7812usb
			10320usb
		12133usb	13362usb
1800 1900	USA, KAIJ Dallas TX	13815na	
1800 1900	USA, KTBN Salt Lake City UT	15590na	
1800 1900	smtwhf USA, WBCQ Kennebunk ME	7415na	
1800 1900	USA, WBCQ Kennebunk ME	9330na	18910na
1800 1900	USA, WBOH Newport NC	5920am	
1800 1900	USA, WEWN Birmingham AL	9450va	15785va
1800 1900	USA, WHRA Greenbush ME	17650na	
1800 1900	USA, WHRI Cypress Creek SC		9840am
	15285am	15650am	
1800 1900	USA, WINB Red Lion PA	13570am	
1800 1900	smtwhf USA, WMLK Bethel PA	9265eu	
1800 1900	USA, WRMI Miami FL	9955am	
1800 1900	USA, WTJC Newport NC	9370na	
1800 1900	USA, WWCR Nashville TN	9985na	12160na
	13845na	15825na	
1800 1900	USA, WWRB Manchester TN	9385na	15250na
1800 1900	USA, WYFR/Family R Okeechobee FL	7240va	
	7345va	13695na	17535na
		18980va	17555na
1800 1900	Yemen, Rep of Yemen Radio	9780me	
1800 1900	Zambia, Christian Voice	4965af	
1815 1900	Bangladesh, Bangla Betar	7185eu	
1830 1845	Israel, Kol Israel	6985va	9345eu
1830 1845	Sweden, IBRA Radio	9529af	
1830 1900	Bulgaria, Radio	5800eu	7500eu
1830 1900	Sweden, Radio	6065eu	
1830 1900	UK, BBC World Service	6005af	9630af
1830 1900	USA, Voice of America	4930af	6080af
	11975af	13710af	15580af
			17895af
1845 1900	Congo, RTV Congolaise	4765af	5985af
1851 1900	DRM New Zealand, Radio NZ Intl	15720pa	

1900 UTC - 2PM EST / 1PM CST / 11AM PST

1900 1915	Congo, RTV Congolaise	4765af	5985af
1900 1928	Vietnam, Voice of 7280va	9730va	
1900 1930	Germany, Deutsche Welle	7245af	9735af
	11690af	12025af	15275af
1900 1930	s Germany, Universal Life	11880me	
1900 1930	Philippines, Radio Pilipinas	11720va	15190va
	17720va		
1900 1930	s UK, Bible Voice	6015eu	
1900 1945	India, All India Radio	7410eu	9445af
	9950eu	11620eu	11935af
		15075af	15155af
			17670af
1900 1950	DRM New Zealand, Radio NZ Intl	15720pa	

1900 1950	New Zealand, Radio NZ Intl	11675pa	
1900 1957	Netherlands, Radio	7120af	7395af
	9895af	11655af	17725na
1900 1957	Sat/Sun Netherlands, Radio	15315na	15525na
		15525na	17725na
1900 2000	Anguilla, University Network	11775am	
1900 2000	Australia, Radio	6080va	7240as
	9580va	9710va	11880pa
1900 2000	Canada, CFRX Toronto ON	6070na	
1900 2000	Canada, CFVP Calgary AB	6030na	
1900 2000	Canada, CKZN St John's NF	6160na	
1900 2000	Canada, CKZU Vancouver BC		6160na
1900 2000	China, China Radio Intl	7295va	9440va
1900 2000	Costa Rica, University Network		11870va
	13750va		
1900 2000	Egypt, Radio Cairo	15375af	
1900 2000	Eqt Guinea, Radio Africa	15190af	
1900 2000	vi Ghana, Ghana BC Corp	3366do	4915do
1900 2000	Italy, IRRS	9310va	
1900 2000	Liberia, ELWA	4760do	
1900 2000	Malaysia, RTM/Trax FM	7295as	
1900 2000	vi Namibia, Namibian BC Corp	3270do	3290do
	6060do	6175do	
1900 2000	Nigeria, Radio/Ibadan	6050do	
1900 2000	Nigeria, Radio/Kaduna	4770do	6090do
1900 2000	Nigeria, Radio/Lagos	3326do	4990do
1900 2000	Nigeria, Voice of	15120af	
1900 2000	North Korea, Voice of Korea	7100af	9975va
	11535va		
1900 2000	Papua New Guinea, Catholic Radio		4960do
1900 2000	Papua New Guinea, NBC	4890do	
1900 2000	vi Papua New Guinea, Wantok R. Light		7120va
1900 2000	Russia, Voice of	6175eu	7105eu
	7335af	11510af	
1900 2000	irreg/ vi Sierra Leone, SLBS	3316do	
1900 2000	vi Solomon Islands, SIBC	5020do	9545do
1900 2000	vi South Africa, Channel Africa	3345af	
1900 2000	South Korea, KBS World Radio		7275eu
1900 2000	Swaziland, TWR	3200af	
1900 2000	Thailand, Radio	7155eu	
1900 2000	vi Uganda, Radio	4976do	5026do
1900 2000	UK, BBC World Service	3255af	5875eu
	5955as	6005af	6190af
			6195eu
		9410eu	9630af
			11955as
		15400af	17830af
1900 2000	a UK, Bible Voice	9775af	
1900 2000	USA, American Forces Radio	4319usb	5446usb
	5765usb	6350usb	7812usb
			10320usb
		12133usb	13362usb
1900 2000	USA, KAIJ Dallas TX	13815na	
1900 2000	USA, KJES Vado NM	15385na	
1900 2000	USA, KTBN Salt Lake City UT	15590na	
1900 2000	USA, Voice of America	4930af	4940af
	6080af	11975af	13710af
			15580af
1900 2000	USA, WBCQ Kennebunk ME	7415na	9330na
	18910na		
1900 2000	USA, WBOH Newport NC	5920am	
1900 2000	USA, WEWN Birmingham AL	9450va	15785va
1900 2000	USA, WHRA Greenbush ME	17650na	
1900 2000	USA, WHRI Cypress Creek SC		9840am
	13760am	15285am	
1900 2000	USA, WINB Red Lion PA	13570am	
1900 2000	smtwhf USA, WMLK Bethel PA	9265eu	
1900 2000	USA, WRMI Miami FL	9955am	
1900 2000	USA, WTJC Newport NC	9370na	
1900 2000	USA, WWCR Nashville TN	9975na	12160na
	13845na	15825na	
1900 2000	USA, WWRB Manchester TN	9385na	15250na
1900 2000	USA, WYFR/Family R Okeechobee FL	7240va	3230af
	6020af	6085am	7395af
		15115af	15565va
			17535na
		18980va	17555na
1900 2000	Zambia, Christian Voice	4965af	
1900 2000	vi Zimbabwe, ZBC Corp	5975do	
1930 2000	s Germany, Pan American BC	9430me	
1930 2000	Iran, Voice of the Islamic Rep	6010eu	6250va
	7320af	9855af	11695af
1930 2000	Lithuania, Radio Vilnius	6250eu	
1930 2000	Serbia, International Radio Serbia		6100eu
1930 2000	Slovakia, Radio Slovakia Int	5915eu	7345eu
1930 2000	Turkey, Voice of	6055eu	
1935 1955	Italy, RAI Intl	6035eu	9760eu
1945 2000	mtwhf Albania, Radio Tirana	6130eu	7465eu
1945 2000	vi Rwanda, Radio	6055do	
1945 2000	Vatican City, Vatican Radio	9800am	
1951 2000	DRM New Zealand, Radio NZ Intl	11675pa	

2000 UTC - 3PM EST / 2PM CST / 12PM PST

2000 2015	f Germany, Pan American BC	9430me
2000 2015	DRM Vatican City, Vatican Radio	9800am

2000	2025	Israel, Kol Israel	6280va	7545va	15640va
2000	2027	Iran, Voice of the Islamic Rep	6010eu	6250va	
		7320af	9855af	11695af	
2000	2028	Hungary, Radio Budapest	3975eu	6025eu	
2000	2030	Egypt, Radio Cairo	15375af		
2000	2030	Germany, Pan American BC	9430me		
2000	2030	Lithuania, Radio Vilnius	6250eu		
2000	2030	Mongolia, Voice of	12015eu		
2000	2030	South Africa, AWR Africa	9655af		
2000	2030	Swaziland, TWR	3200af		
2000	2030	Turkey, Voice of	6055eu		
2000	2030	Vatican City, Vatican Radio	7365af	9755af	
		11625af			
2000	2057	Germany, Deutsche Welle	6145af	9735af	
		9830af	12025af	15275af	
2000	2057	Netherlands, Radio	7120af	11655af	
		15525na	17725na	17810af	
2000	2057	Netherlands, Radio	15315na	15525na	
		17725na			
2000	2059	Spain, Radio Exterior Espana	9680af	11680af	
2000	2100	Anguilla, University Network	11775am		
2000	2100	Australia, ABC NT Alice Springs		2310do	
		4835do			
2000	2100	Australia, ABC NT Katherine	2485do		
2000	2100	Australia, ABC NT Tennant Creek		2325do	
2000	2100	Australia, Radio	6080va	7240as	9500as
		11650pa	11660pa	11880pa	
2000	2100	Belarus, Radio	7360eu	7390eu	7420eu
2000	2100	Canada, CFRX Toronto ON	6070na		
2000	2100	Canada, CFVP Calgary AB	6030na		
2000	2100	Canada, CKZN St John's NF	6160na		
2000	2100	Canada, CKZU Vancouver BC		6160na	
2000	2100	China, China Radio Intl	5960eu	7170eu	
		7190eu	7285eu	7295va	
		9440va	9600eu	11640af	13630af
		Costa Rica, University Network		13750va	
2000	2100	Eqt Guinea, Radio Africa	15190af		
2000	2100	Ghana, Ghana BC Corp	3366do	4915do	
2000	2100	Indonesia, Voice of	9525eu	11785eu	
		15150af			
2000	2100	Italy, IRRS	5775eu		
2000	2100	Liberia, ELWA	4760do		
2000	2100	Malaysia, RTM/Trax FM	7295as		
2000	2100	Namibia, Namibian BC Corp	3270do	3290do	
		6060do	6175do		
2000	2100	New Zealand, Radio NZ Intl	17675pa		
2000	2100	New Zealand, Radio NZ Intl	11675pa		
2000	2100	Nigeria, Radio/Ibadan	6050do		
2000	2100	Nigeria, Radio/Kaduna	4770do	6090do	
2000	2100	Nigeria, Radio/Lagos	3326do	4990do	
2000	2100	Nigeria, Voice of	15120af		
2000	2100	Papua New Guinea, Catholic Radio	4960do		
2000	2100	Papua New Guinea, NBC	4890do		
2000	2100	Papua New Guinea, Wantok R. Light		7120va	
2000	2100	Russia, Voice of	5955as	6145eu	7105eu
		7290eu	7330eu		
2000	2100	Solomon Islands, SIBC	5020do	9545do	
2000	2100	South Africa, Channel Africa	3345af		
2000	2100	Uganda, Radio	4976do	5026do	
2000	2100	UK, BBC World Service	3255af	5875eu	
		6005af	6190af	6195eu	9630af
		12095af	15400af	17830af	
2000	2100	USA, American Forces Radio	4319usb	5446usb	
		5765usb	6350usb	7812usb	10320usb
		12133usb	13362usb	12579usb	
2000	2100	USA, KAIJ Dallas TX	13815na		
2000	2100	USA, KJES Vado NM	15385na		
2000	2100	USA, KTBN Salt Lake City UT	15590na		
2000	2100	USA, WBCQ Kennebunk ME	7415na	9330na	
		18910na			
2000	2100	USA, WBOH Newport NC	5920am		
2000	2100	USA, WEWN Birmingham AL	9450va	15785va	
2000	2100	USA, WHRI Cypress Creek SC		11765am	
		15285am			
2000	2100	USA, WINB Red Lion PA	13570am		
2000	2100	USA, WMLK Bethel PA	9265eu		
2000	2100	USA, WRMI Miami FL	9955am		
2000	2100	USA, WTJC Newport NC	9370na		
2000	2100	USA, WWCR Nashville TN	9975na	12160na	
		13845na	15825na		
2000	2100	USA, WWRB Manchester TN	9385na	15250na	
2000	2100	USA, WYFR/Family R Okeechobee FL		3230af	
		5745va	5810va	6855va	7300va
		7580va	15115af	15195af	
2000	2100	Zambia, Christian Voice	4965af		
2000	2100	Zimbabwe, ZBC Corp	5975do		
2005	2100	Syria, Radio Damascus	9330eu	12085eu	
2025	2045	Italy, RAI Intl	6010va		
2030	2045	Thailand, Radio	9535eu		
2030	2058	Vietnam, Voice of	7280va	9550va	9730va
		13860va			
2030	2100	Cuba, Radio Havana	9505va		

2030	2100	Sweden, Radio	6065va	7420va	
2030	2100	USA, Voice of America	4930af	6080af	
		7595as	11975af	13710af	15580af
2030	2100	USA, Voice of America	4940af		
2045	2100	India, All India Radio	7410eu	9445eu	
		9910oc	9950eu	11620eu	11715oc
2050	2100	Vatican City, Vatican Radio	4005eu	5885eu	
		7250eu			

2100 UTC - 4PM EST / 3PM CST / 1PM PST

2100	2120	Vatican City, Vatican Radio	4005eu	5885eu	
		7250eu			
2100	2127	Czech Rep, Radio Prague	5930va	9430va	
2100	2130	Albania, Radio Tirana	7530eu		
2100	2130	Australia, ABC NT Katherine	2485do		
2100	2130	Australia, ABC NT Tennant Creek		2325do	
2100	2130	Austria, AWR Europe	9830af		
2100	2130	Canada, CBC NQ SW Service	9625na		
2100	2130	China, China Radio Intl	11640af	13630af	
2100	2130	Cuba, Radio Havana	9505va		
2100	2130	Italy, IRRS	5775eu		
2100	2130	USA, Voice of America	7595as		
2100	2145	Nigeria, Radio/Ibadan	6050do		
2100	2150	New Zealand, Radio NZ Intl	17675pa		
2100	2150	New Zealand, Radio NZ Intl	11675pa		
2100	2159	Canada, Radio Canada Intl	5850eu	9770eu	
		15180am			
2100	2159	Germany, Overcomer Ministries		9785eu	
2100	2159	Spain, Radio Exterior Espana	6125eu	11625af	
2100	2200	Anguilla, University Network	11775am		
2100	2200	Australia, ABC NT Alice Springs		2310do	
		4835do			
2100	2200	Australia, Radio	9500as	9660as	11650pa
		11695pa	12080as	13630as	15515as
2100	2200	Belarus, Radio	7360eu	7390eu	7420eu
2100	2200	Canada, CFRX Toronto ON	6070na		
2100	2200	Canada, CFVP Calgary AB	6030na		
2100	2200	Canada, CKZN St John's NF	6160na		
2100	2200	Canada, CKZU Vancouver BC		6160na	
2100	2200	China, China Radio Intl	9600eu	7190eu	
		9600eu			
2100	2200	Costa Rica, University Network		13750va	
2100	2200	Eqt Guinea, Radio Africa	15190af		
2100	2200	Germany, Deutsche Welle	7280af	9615af	
		11690af			
2100	2200	Ghana, Ghana BC Corp	3366do	4915do	
2100	2200	Guyana, Voice of	3291do	5950do	
2100	2200	India, All India Radio	7410eu	9445eu	
		9910oc	9950eu	11620eu	11715oc
2100	2200	Japan, Radio Japan/NHK World	6090eu	6180eu	11855ca
		21670pa			17825na
2100	2200	Liberia, ELWA	4760do		
2100	2200	Liberia, Star Radio		11960af	
2100	2200	Malaysia, RTM/Trax FM	7295as		
2100	2200	Namibia, Namibian BC Corp	3270do	3290do	
		6060do	6175do		
2100	2200	Nigeria, Radio/Kaduna	4770do	6090do	
2100	2200	Nigeria, Radio/Lagos	3326do	4990do	
2100	2200	North Korea, Voice of Korea	7570eu	12015eu	
2100	2200	Papua New Guinea, Catholic Radio	4960do		
2100	2200	Papua New Guinea, NBC	4890do		
2100	2200	Papua New Guinea, Wantok R. Light		7120va	
2100	2200	Rwanda, Radio	6055do		
2100	2200	Sierra Leone, SLBS	3316do		
2100	2200	South Africa, Channel Africa	3345af		
2100	2200	Syria, Radio Damascus	9330eu	12085eu	
2100	2200	UK, BBC World Service	3255af	3915as	
		5875eu	5965as	6005af	6125as
		6190af	6195va	9480eu	9650eu
		11675am	15400af		
2100	2200	USA, American Forces Radio	4319usb	5446usb	
		5765usb	6350usb	7812usb	10320usb
		12133usb	13362usb	12579usb	
2100	2200	USA, KAIJ Dallas TX	13815na		
2100	2200	USA, KTBN Salt Lake City UT	15590na		
2100	2200	USA, Voice of America	6080af	15580af	
2100	2200	USA, WBCQ Kennebunk ME	7415na	9330na	
		18910na			
2100	2200	USA, WBOH Newport NC	5920am		
2100	2200	USA, WEWN Birmingham AL	6890va	15785va	
2100	2200	USA, WHRI Cypress Creek SC		9660am	
		11765am			
2100	2200	USA, WINB Red Lion PA	13570am		
2100	2200	USA, WRMI Miami FL	9955am		
2100	2200	USA, WTJC Newport NC	9370na		
2100	2200	USA, WWCR Nashville TN	9975na	12160na	
		13845na	15825na		
2100	2200	USA, WWRB Manchester TN	9385na		
2100	2200	USA, WYFR/Family R Okeechobee FL		5745va	

		5810va	5955af	6855va	7300va
		7580va	15195af	15565af	
2100	2200	Zambia, Christian Voice			
2100	2200	Zimbabwe, ZBC Corp			
2115	2200	Egypt, Radio Cairo			
2115	2200	USA, WYFR/Family R Okeechobee FL			
2130	2156	Romania, Radio Romania Intl			
		7145va	9755va	6055va	6115va
2130	2200	Australia, ABC NT Katherine			
2130	2200	Australia, ABC NT Tennant Creek			
2130	2200	Canada, CBC NQ SW Service			
2130	2200	Guam, AWR/KSDA			
2130	2200	Netherlands, Radio			
2130	2200	Turkey, Voice of			
2130	2200	USA, Voice of America			
2151	2200	New Zealand, Radio NZ Intl			
2151	2200	New Zealand, Radio NZ Intl			

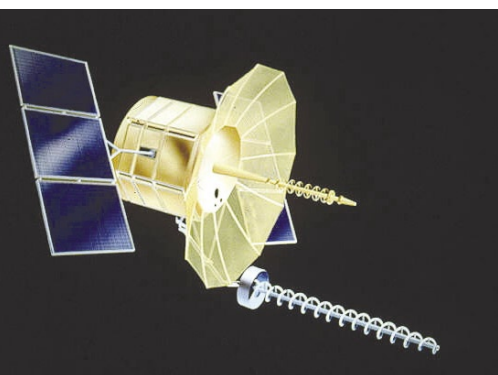
2200 UTC - 5PM EST / 4PM CST / 2PM PST

2200	2210	Syria, Radio Damascus			
2200	2228	Hungary, Radio Budapest			
2200	2230	India, All India Radio			
		11715oc	9950eu	11620eu	11715oc
2200	2230	Papua New Guinea, NBC			
2200	2230	South Korea, KBS World Radio			
2200	2230	Turkey, Voice of			
2200	2245	Egypt, Radio Cairo			
2200	2257	Netherlands, Radio			
2200	2259	Canada, Radio Canada Intl			
2200	2259	Canada, Radio Canada Intl			
2200	2300	Anguilla, University Network			
2200	2300	Australia, ABC NT Alice Springs			
		4835do			2310do
2200	2300	Australia, ABC NT Katherine			
2200	2300	Australia, ABC NT Tennant Creek			
2200	2300	Australia, Radio			
		15240pa	15515va	17785va	15230va
2200	2300	Belarus, Radio			
2200	2300	Bulgaria, Radio			
2200	2300	Canada, CBC NQ SW Service			
2200	2300	Canada, CFRX Toronto ON			
2200	2300	Canada, CFVP Calgary AB			
2200	2300	Canada, CKZN St John's NF			
2200	2300	Canada, CKZU Vancouver BC			
2200	2300	China, China Radio Intl			
2200	2300	Costa Rica, University Network			
2200	2300	Eq Guinea, Radio Africa			
2200	2300	Ghana, Ghana BC Corp			
2200	2300	Guyana, Voice of			
2200	2300	Malaysia, RTM/Trax FM			
2200	2300	Namibia, Namibian BC Corp			
		6060do	6175do		3290do
2200	2300	New Zealand, Radio NZ Intl			
2200	2300	New Zealand, Radio NZ Intl			
2200	2300	Nigeria, Radio/Kaduna			
2200	2300	Nigeria, Radio/Lagos			
2200	2300	Papua New Guinea, Catholic Radio			
2200	2300	Papua New Guinea, Wantok R. Light			
2200	2300	Sierra Leone, SLBS			
2200	2300	Solomon Islands, SIBC			
2200	2300	Taiwan, Radio Taiwan Intl			
2200	2300	UK, BBC World Service			
		5975am	6195as	7105as	9480eu
		9650eu	9740af	15400af	
2200	2300	Ukraine, Radio Ukraine Intl			
2200	2300	USA, American Forces Radio			
		5765usb	6350usb	7812usb	10320usb
		12133usb	13362usb	12579usb	
2200	2300	USA, KAIJ Dallas TX			
2200	2300	USA, KTBN Salt Lake City UT			
2200	2300	USA, Voice of America			
		11725va	15185va	15290va	7405as
2200	2300	USA, WBCQ Kennebunk ME			
2200	2300	USA, WBCQ Kennebunk ME			
2200	2300	USA, WBOH Newport NC			
2200	2300	USA, WEWN Birmingham AL			
2200	2300	USA, WHRI Cypress Creek SC			
		9660am			7490am
2200	2300	USA, WINB Red Lion PA			
2200	2300	USA, WRMI Miami FL			
2200	2300	USA, WTJC Newport NC			
2200	2300	USA, WWCR Nashville TN			
		12160na	13845na		9985na
2200	2300	USA, WWRB Manchester TN			
2200	2300	USA, WYFR/Family R Okeechobee FL			
2200	2300	Zambia, Christian Voice			
2205	2230	Italy, RAI Intl			
2230	2257	Czech Rep, Radio Prague			
2230	2300	Guam, AWR/KSDA			
2230	2300	Papua New Guinea, NBC			

2230	2300	Sweden, Radio			
2230	2300	USA, Voice of America			
		13755va	7230va	9780va	
2245	2300	India, All India Radio			
		11620as	11645as	13605as	9950as

2300 UTC - 6PM EST / 5PM CST / 3PM PST

2300	0000	Anguilla, University Network			
2300	0000	Australia, ABC NT Alice Springs			
		4835do			2310do
2300	0000	Australia, ABC NT Katherine			
2300	0000	Australia, ABC NT Tennant Creek			
2300	0000	Belarus, Radio			
2300	0000	Canada, CBC NQ SW Service			
2300	0000	Canada, CFRX Toronto ON			
2300	0000	Canada, CFVP Calgary AB			
2300	0000	Canada, CKZN St John's NF			
2300	0000	Canada, CKZU Vancouver BC			
2300	0000	China, China Radio Intl			
		6040na	6145as	5915as	5990am
2300	0000	Costa Rica, University Network			
2300	0000	Cuba, Radio Havana			
2300	0000	Egypt, Radio Cairo			
2300	0000	Guyana, Voice of			
2300	0000	India, All India Radio			
2300	0000	Malaysia, RTM/Trax FM			
2300	0000	Namibia, Namibian BC Corp			
		6060do	6175do		3290do
2300	0000	New Zealand, Radio NZ Intl			
2300	0000	Papua New Guinea, Catholic Radio			
2300	0000	Papua New Guinea, NBC			
2300	0000	Papua New Guinea, Wantok R. Light			
2300	0000	Sierra Leone, SLBS			
2300	0000	Singapore, MediaCorp Radio			
2300	0000	Solomon Islands, SIBC			
2300	0000	Turkey, Voice of			
2300	0000	UK, BBC World Service			
		5985as	6170as	9480eu	11945as
		11955as			
2300	0000	USA, American Forces Radio			
		5765usb	6350usb	7812usb	10320usb
		12133usb	13362usb	12579usb	
2300	0000	USA, KAIJ Dallas TX			
2300	0000	USA, KTBN Salt Lake City UT			
2300	0000	USA, Voice of America			
		11725va	15185va	15290va	7405va
2300	0000	USA, WBCQ Kennebunk ME			
		9330na	18910na		7415na
2300	0000	USA, WBOH Newport NC			
2300	0000	USA, WEWN Birmingham AL			
2300	0000	USA, WHRI Cypress Creek SC			
		7490am			7315am
2300	0000	USA, WINB Red Lion PA			
2300	0000	USA, WRMI Miami FL			
2300	0000	USA, WRMI Miami FL			
2300	0000	USA, WTJC Newport NC			
2300	0000	USA, WWCR Nashville TN			
		9985na	13845na		7465na
2300	0000	USA, WWRB Manchester TN			
2300	0000	Zambia, Christian Voice			
2300	2315	Nigeria, Radio/Kaduna			
2300	2315	Nigeria, Radio/Lagos			
2300	2315	USA, WYFR/Family R Okeechobee FL			
		15170am	15400am	17555na	11875af
2300	2330	Australia, Radio			
		13670pa	15230pa	15240va	17785va
		17795va			
2300	2330	USA, Voice of America			
		15150va			7205va
2300	2330	Vatican City, Vatican Radio			
2300	2356	Romania, Radio Romania Intl			
		7105va	9610va	9755va	6155va
2300	2359	Canada, Radio Canada Intl			
2315	2330	Croatia, Croatian Radio			
2330	0000	Australia, Radio			
		13670pa	15230pa	15415va	17750va
		17785va	17795va		
2330	0000	Burma, Dem Voice of Burma			
2330	0000	Sweden, Radio			
2330	0000	USA, Voice of America			
		11665va	13640va	15150va	7205va
2330	2357	Czech Rep, Radio Prague			
2330	2358	Vietnam, Voice of			
2335	0000	Austria, Radio Austria Intl			
2343	2368	Austria, Radio Austria Intl			



The FLTSATCOM System

Itake great pleasure in inaugurating...the first satellite of the fleet satellite communications system. The gap is filled."

With that message sent by Admiral James L. Holloway III, then Chief of Naval Operations in 1978, the FLTSATCOM system became operational.

FLTSATCOM (pronounced FleetSatCom, for Fleet Satellite Communications) is a versatile, high-capacity worldwide military communications system operated by the United States. NASA launched all eight of these spacecraft for the military services, all on Atlas/Centaur vehicles. With the launch of FLTSATCOM-8, there are six FLTSATCOM satellites in orbit, with two operational.

FLTSATCOM platforms provide instant communications between the President and commanding officers in the United States and remote units stationed anywhere in the world. In addition to the Ultra High Frequency (UHF) capability of the earlier satellites in this series, FLTSATCOMs 7 and 8 also carry an Extremely High Frequency (EHF) communications package. This package has served as a test bed for the MILSTAR system terminals.

The Navy portion of the FLTSATCOM shared system provides communications between naval aircraft, ships, submarines, and ground stations. The Air Force portion of each satellite is part of the USAF Satellite Communications System (AFSATCOM). AFSATCOM links the National Command Authority with Strategic Command units, and other arms of the Air Force. Each satellite contains the communications package outlined in Table I. Table II is a synopsis of the FLTSATCOM satellite launches to date. Table III is a detailed breakdown of the UHF communications packages aboard each FLTSATCOM. FLTSATCOM bandplans use the designators A (Alpha), B (Bravo) and C (Charlie).

Launch History

FLTSATCOM-1, launched in February 1978, provided service from Southeast Asia across the Pacific to the West Coast of the United States from

its 172 deg East orbital slot. FLTSATCOM-2, launched in May 1979, was initially positioned at the 23 degree West orbital slot. After the launch of FLTSATCOM-3, this satellite was moved to the 72 degree East orbital slot to cover the Indian Ocean area from Africa to the Philippines.

FLTSATCOM-3, launched in January 1980, provided service from the middle of the United States across the Atlantic and the Mediterranean. FLTSATCOM-4, launched in October 1980, was co-located with FLTSATCOM-1 to provide coverage over the Pacific. FLTSATCOM-5, launched in August 1981, was damaged during launch and was never declared operational. FLTSATCOM-7 (aka USA 20), launched in December 1986, was placed in orbit co-located with FLTSATCOM-1. It now provides service over the United States from its 100 degree West orbital slot. FLTSATCOM-6 was lost after being struck by lightning shortly after launch in March 1987. FLTSATCOM-8 (aka USA 46), launched in September 1989, was placed over the Atlantic at the 23 degree West orbital slot.

Once in this transfer orbit, the Centaur stage released the spacecraft and, as its final act, performed a retro-maneuver which took it safely out of the flight path. The U.S. Air Force Space Systems Division (SSD) then assumed command of the satellite, operating through its Consolidated Space Test Center (CSTC) at Onizuka Air Force Base, Sunnyvale, California. NASA tracking stations throughout the world (together with the Air Force Satellite Control Network Remote Tracking Stations) provided range and range-rate measurement support to assist the CSTC controllers in bringing the satellite on station.

The elliptical transfer orbit was designed so that the satellite would reach its apogee while over the equator. To convert the orbit from an elliptical to a circular one and change the angle of inclination so that the flight path would be more nearly above the equator, CSTC operators correctly aimed the spacecraft, then fired an onboard solid propellant motor at a selected apogee. This final burn "transferred" the satellite into a circular "drift" orbit, almost at

Table II: FLTSATCOM Spacecraft Constellation

Name	Intl Desig	Date	Orbital Loc	Notes
FltSatCom 1 (Ops 6391)	1978-016A	2/9/78		Alpha (Retired from service)
FltSatCom 2 (Ops 6392)	1979-038A	5/4/79		Charlie (Retired from service)
FltSatCom 3 (Ops 6393)	1980-004A	1/18/80		Bravo (Retired from service)
FltSatCom 4 (Ops 6394)	1980-087A	10/31/80		Bravo (Retired from service)
FltSatCom 5 (Ops 6395)	1981-073A	8/6/81		Satellite inoperative
FltSatCom 7 (USA 20)	1986-096A	12/5/86	100 deg West	Charlie*
FltSatCom 6	None	3/26/87	Fail to orbit	Destroyed by range safety
FltSatCom 8 (USA 46)	1989-077A	9/25/89	23 deg West	Bravo*

* Carries and EHF comm package, 44-GHz uplink and 20-GHz downlink

Launch Profile/On-Orbit Operations

FLTSATCOMs were launched on Atlas-Centaur rockets from Launch Complex 36 on the Cape Canaveral Air Force Station in Florida. After launch, the Atlas stage completed its burn and fell into the ocean. The first burn of the Centaur stage injected the spacecraft into a parking orbit, at a perigee altitude of about 148 kilometers (92 statute miles) and apogee of approximately 369 kilometers (229 statute miles). After a coast period of about 14 minutes, the Centaur engines were ignited again and they placed the spacecraft into a highly elliptical, or egg-shaped, "transfer orbit" with an apogee of about 35,988 kilometers (22,362 miles).

synchronous altitude and with the angle of inclination reduced to 5 degrees. The FLTSATCOM then drifted into its assigned place in the global network, where the CSTC controllers fired small thrusters of the onboard hydrazine reaction control system to stop the drift motion.

When the satellite was located above and in line with the equator at an altitude of about 35,789 kilometers (22,238 miles) and a velocity of 11,071 kilometers (6,879 miles per hour), the movement became "synchronized" with that of the Earth below. Thus, the satellite appears to remain stationary in the sky, while actually completing one orbit every 24 hours. All fully geosynchronous satellites, including those for commercial communications, weather observation, and military communications, are stationed in this type of orbit above the equator at the same altitude, spaced around a circle about 266,000 kilometers (165,000 miles) in circumference. They are carefully separated by distance or by assigned radio frequencies to prevent interference between their individual communications systems.

Once on station, the FLTSATCOM satellites

Table I: FLTSATCOM Communications Packages

Channel	Comm Package	User
1	1 25-kHz Fleet Broadcast Channel	US Navy
2	1 500-kHz Wideband Channel	National Command Authority
3-11	9 25-kHz Fleet Relay Channels	US Navy
12-23	12 5-kHz AFSATCOM	US Air Force

were inclined to the equator, so that it appears from the ground to be moving back and forth from north to south. At the same time, it appears to ground observers to move slightly east and west from the center point of the orbit, tracing a constant "figure 8" across the equator in the sky.

Satellite Description

FLTSATCOM-7/8, with a 37 kilogram (81pound) adapter for connection to the vehicle, weighed about 2,296 kilograms (5,061 pounds) on the ground, and had a mass of about 1,223 kilograms (2,696 pounds) in space after burning up the apogee motor propellants. Both satellites measure 13.2 meters (43.4 feet) from tip to tip of the fully extended solar panels. The main body is 2.3 meters (7.5 feet) wide and 6.6 meters (21.6 feet) high from the bottom of the body to the tip of the offset spiral antenna mast. Both the spiral antenna and the solar panels were in a retracted configuration for launch, as was the 4.9 meter (16 foot) diameter, silver-filled stainless steel mesh UHF antenna.

The main body consists of three attached hexagonal modules called the payload module, the spacecraft module, and the EHF module or FEP (Fleet EHP Package). The solar arrays extend from the spacecraft module, which also contains the hydrazine-fueled reaction control system thrusters and tanks, Sun and Earth sensors, a reaction wheel which spins to hold the spacecraft steady in its operating attitude, and the other systems needed for control and operation of the spacecraft.

The payload module contains the three antenna systems, the transponders for the 23 UHF channels, and all the associated electronics required to support communications functions. The offset mast is the UHF transmit antenna. A small, separate conical helix antenna atop the central mast serves as the S-band Tracking, Telemetry and Control (TT&C) antenna, and is used to command and monitor the spacecraft on 2202.5, 2252.5, and 2262.5-MHz. The superhigh frequency antenna horn protrudes through a hole cut into the UHF antenna mesh.

The FEP also contains the Extremely High Frequency communications package, with its 30 (maximum) voice channels. The package was designed and built by the MIT Lincoln Laboratory in Lexington, Massachusetts. The EHF antenna, consisting of a 5 degree steerable spot beam and an Earth coverage aperture, looks through cutouts in the center portion of the UHF transmitting antenna.

In operation, the momentum wheel provides a means to control the spacecraft attitude so that the antennas are always aimed at the Earth. The two solar arrays rotate on their extended arms so that they constantly face the Sun. These two arrays contain three panels each, with a total of 23,000 solar cells, each 2 by 4 centimeters (0.79 by 1.57 inches) in size, that produced about 2,200 watts at the beginning of their orbital life. Three 24-cell nickel-cadmium batteries provide power when the spacecraft must operate in the Earth's shadow; 2,150 of the solar cells are reserved for battery charging.

This aging satellite constellation has been providing service to the fleet for well over 28 years and was supplemented in the 1980s with the LEASAT constellation of satellites. We will explore those birds in our next *Milcom* column. So until next time, 73 and good hunting.

Table III: FLTSATCOM Bandplans

Fleet Broadcast (25-kHz bandwidth)

Channel No.	Alpha (Downlink/Uplink)	Bravo (Downlink/Uplink)	Charlie (Downlink/Uplink)
1	250.450/SHF		250.550/SHF
	250.650/SHF		

Note: The Fleet Satellite Broadcast Subsystem has 15 subchannels of encrypted message traffic at an input data rate of 75 bps per channel. These subchannels are time-division multiplexed and transmitted in a one-way RF transmission at 1200 bps. The shore-based terminal transmits this data on a direct sequence spread-spectrum SHF signal to the UHF satellites, where the signal is translated to UHF and down-linked to the subscribers. The queued and/or channelized message traffic for Fleet Satellite Broadcast transmission is encrypted and inputted to a time-division multiplexer, where it becomes a 1200-bps data stream and is passed to the transmitter. The structure of the Fleet Satellite Broadcast transmission allows 15 subchannels: eleven 75-bps subchannels for general-service message traffic, two 75-bps subchannels for special-intelligence message traffic, and two 75-bps subchannels for Fleet weather data. A sixteenth subchannel in the Fleet Satellite Broadcast transmission is used for frame synchronization.

Navy Fleet Relay (25-kHz bandwidth)

2	251.950/292.350	252.050/293.050	252.150/293.150
3	253.650/294.650	253.750/294.750	253.850/294.850
4	255.350/296.350	255.450/296.450	255.550/296.550
5	256.950/297.950	257.050/298.050	257.150/298.150
6	258.450/299.450	258.550/299.550	258.650/299.650
7	265.350/306.350	265.450/306.450	265.550/306.550
8	266.850/307.850	266.950/307.950	267.050/308.050
9	268.250/309.250	268.350/309.350	268.450/309.450
10	269.750/310.750	269.850/310.850	269.950/310.850

AFSATCOM (5-kHz bandwidth)

11	243.945/317.045	244.045/317.145	244.145/317.245
12	243.955/317.055	244.055/317.155	244.155/317.255
13	243.960/317.060	244.060/317.160	244.160/317.260
14	243.965/317.065	244.065/317.165	244.165/317.265
15	243.970/317.070	244.070/317.170	244.170/317.270
16	243.975/317.075	244.075/317.175	244.175/317.275
17	243.980/317.080	244.080/317.180	244.180/317.280
18	243.985/317.085	244.085/317.185	244.185/317.285
19	243.990/317.090	244.090/317.190	244.190/317.290
20	243.995/317.095	244.095/317.195	244.195/317.295
21	244.000/317.100	244.100/317.200	244.200/317.300
22	244.010/317.110	244.110/317.210	244.210/317.310

Note: AFSATCOM 5-kHz channels 11-17 are regenerative, which means that the uplink RF signal at 317-MHz containing 75 bps messages, is converted to baseband; the message bits are amplified, reshaped, and remodulated and transmitted on the downlink at 243 MHz. Processing limits the signal to 75 bps and requires a special radio. AFSATCOM 5-kHz channels 18-22 are non-regenerative as there is no processing done other than the conversion. AFSATCOM is specifically designed for emergency action message (EAM) dissemination, force direction, force report back and Commander-in-Chief (CINC) internetting. The AFSATCOM terminal segment consists of all Air Force airborne and ground communication equipment, required interfaces, and related terminal equipment.

500-kHz Wideband Transponder

23*	260.600/294.200	261.700/295.300	262.300/295.900
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Wideband Channel 23 Breakout*

23-1	260.350/293.950	261.450/295.050	262.050/295.650
23-2	260.375/293.975	261.475/295.075	262.075/295.675
23-3	260.400/294.000	261.500/295.100	262.100/295.700
23-4	260.425/294.025	261.525/295.125	262.125/295.725
23-5	260.450/294.050	261.550/295.150	262.150/295.750
23-6	260.475/294.075	261.575/295.175	262.175/295.775
23-7	260.500/294.100	261.600/295.200	262.200/295.800
23-8	260.525/294.125	261.625/295.225	262.225/295.825
23-9	260.550/294.150	261.650/295.250	262.250/295.850
23-10	260.575/294.175	261.675/295.275	262.275/295.875
23-11	260.600/294.200	261.700/295.300	262.300/295.900
23-12	260.625/294.225	261.725/295.325	262.325/295.925
23-13	260.650/294.250	261.750/295.350	262.350/295.950
23-14	260.675/294.275	261.775/295.375	262.375/295.975
23-15	260.700/294.300	261.800/295.400	262.400/296.000
23-16	260.725/294.325	261.825/295.425	262.425/296.025
23-17	260.750/294.350	261.850/295.450	262.450/296.050
23-18	260.775/294.375	261.875/295.475	262.475/296.075
23-19	260.800/294.400	261.900/295.500	262.500/296.100
23-20	260.825/294.425	261.925/295.525	262.525/296.125
23-21	260.850/294.450	261.950/295.550	262.550/296.150

Note: Two operating modes are used on these UHF channels. The narrowband mode is limited to a 5-kHz bandwidth (a single 5-kHz channel, or a 5-kHz bandwidth on a 25-kHz or 500-kHz channel). The wideband mode is limited to a 25-kHz bandwidth (a single 25-kHz channel, or a 25-kHz bandwidth on a 25-kHz or 500-kHz channel).

Projects, Close-Ups, and a Contest

❖ MT 25th Anniversary

Greetings to all the *Monitoring Times Fed Files* readers and Happy New Year! 2007 begins the 26th year for *Monitoring Times* and to commemorate over a quarter-century of publication we are having a *Fed Files* contest. The prize is an original copy of *Monitoring Times*, Volume 1 Number 4. This copy of *MT* is the large, newspaper format of the early days, and features a cover article proclaiming the end of federal frequencies being available to the public – the main event that made this column indispensable!

If you are interested in entering the drawing for this copy of *Monitoring Times*, just send us your name and e-mail or mailing address. We would also like to know what subjects you might be interested in reading about in future *Fed Files* columns. Entries can be e-mailed to me at chrisparris@monitoringtimes.com or you can mail your entries to Monitoring Times, 7546 Highway 64W, Brasstown, NC 28902. The entry deadline for this drawing will be February 15th and we'll announce the winner shortly thereafter.

❖ Bureau of Prisons Frequency Project

I recently asked the *Fed Files* blog readers to help with compiling a listing of radio systems and frequencies used at the various US Bureau of Prisons facilities across the country. As this database is updated, it will be made available as a download on the *Monitoring Times* website as a bonus feature for *MT* and *Fed File* readers. We will continue to update this database as information is received, so you will be able to download the latest version. If you regularly monitor a federal prison facility and would like to share any information on the radio systems they use, sent it to the *Fed Files*.

Be sure and check the *Monitoring Times* web site for the special features for *MT* readers only! Just point your browser to www.monitoringtimes.com and use the password provided in the current issue of *MT*.

❖ Justice Department 25 Cities Project

The Justice Department has a program that they are calling the 25 Cities Project. Basically, the goal is to achieve radio interoperability between federal and local radio systems

in 25 major U.S. cities. You can find some very informative downloads at the project's web site: www.ojp.usdoj.gov/nij/topics/commtech/25cities/

One example of what the 25 Cities Project is hoping to accomplish is a system in the Los Angeles area called LARTCS or **Los Angeles Regional Tactical Communications System**. You can visit the LARTCS web site at www.lartcs.org/.

The LARTCS program allows many different agencies with very different radio systems and frequencies to talk to each other in case of an emergency. The program involves many Southern California public safety organizations, state public safety agencies and federal agencies, including the FBI and Department of Homeland Security.

Here is a listing of all the frequencies that can be tied together when needed:

LA REGIONAL TACTICAL COMMUNICATIONS SYSTEM
 036.5000 California National Guard
 155.3400 CSQ EMS HEAR
 155.4750 156.7 pl National Law Enforcement Common, "NALEMARS"
 157.1750 CSQ US Coast Guard Marine Ch-23
 159.0300 CSQ Los Angeles INTEROP D
 159.1800 CSQ Los Angeles INTEROP C
 406.8000 156.7 pl "NALEMARS" Federal UHF
 483.5875 186.2 pl Los Angeles Sheriff MA-1 NORTH
 484.0875 186.2 pl Los Angeles Sheriff MA-2 WEST
 483.7875 186.2 pl Los Angeles Sheriff MA-3 EAST
 484.1375 186.2 pl Los Angeles Sheriff MA-4 SAN GABRIEL VALLEY
 484.0625 186.2 pl Los Angeles Sheriff MA-5 CENTRAL
 866.0125 156.7 pl Nationwide I-CALL
 868.5125 156.7 pl "CLEMARS" 8
 Also, Talk Group 13-025 on the LA County EDACS Trunked System B

This list does not include two additional federal VHF repeaters that were planned for the Los Angeles area in the summer of 2006. I have not confirmed what those frequencies are, but reports from the LA area had some new P-25 activity on 172.7375 MHz, which may be one of them.

❖ Agency Close Up: Postal Inspectors

Over the last few years, the United States Postal Inspectors Service has been reorganizing its radio communications systems across the country. Many cities are now

using P-25 digital radio systems, but some cities continue to use analog systems. They have also organized a national dispatching system they are referring to as NLECC or National Law Enforcement Control Center.

There are two Postal Service Control Centers around the country, one located in Dulles, Virginia, and the other in Fort Worth, Texas. The Ft. Worth NLECC appears to be dispatching for my home area in Portland, Oregon. This appears to be similar to the Federal Protective Service's "Mega Centers" that monitor alarms and dispatch for many different cities.

The Postal Inspectors can be heard using the "IDA" call sign on their radio channels, and when technicians were heard setting up the P-25 repeater in Portland, I think I heard one of them using a "SAM" call sign (or the technicians name could have been Sam!).

Unlike some federal law enforcement agencies, the Postal Inspectors have never had a nationwide band plan or channel plan. I once caught some conversations over the air that indicated the mobile radios the Postal Inspectors were using carried over 100 channels, all programmed with different Postal Inspector frequencies in various cities around the country. Here is a list of possible Postal Inspectors frequencies in use around the country. Note that many of these allocations are for the Post Office and could be for not only Postal Inspectors but normal Post Office operations as well:

406.1125 406.2250 406.2500 406.3500
 406.3250 406.3375 406.3750 406.3875
 406.4750 406.6625 406.8125 406.9750
 407.1375 407.1500 407.1750 407.2750
 407.5500 407.6500 407.7250 407.7750
 408.0000 408.0250 408.0500 408.1000
 408.1250 408.1500 408.1750 408.4250
 408.4750 408.5250 408.5750 408.6250
 408.8250 409.0250 409.1000 409.1750
 409.2000 409.2750 409.3000 409.3500
 409.3750 409.4500 409.5250 409.5500
 409.6375 409.6500 409.7750 409.8250
 409.9000 409.9375 410.0000 410.0250
 410.2000 410.3250-Nationwide 410.3500
 411.2750 411.3500 411.4000 411.4500
 411.5000 411.5500 411.5750 411.6250
 411.6500 411.7750 412.0000 412.0250
 412.2750 412.3500 412.4750 412.7500
 413.5750 413.6000 413.6250 413.7000
 413.8000 413.8250 414.1500 414.3250
 414.4000 414.4250 414.4500 414.6250
 414.6500 414.7250 414.7500-Nationwide
 414.9750 415.0500-Nationwide 415.1500
 415.3250 415.3375 415.3500 415.3750
 415.3875 415.4500 415.4750 416.7250
 416.7750 417.0000 418.3000



And speaking of the Postal Inspectors, in the November *Fed Files* I passed along some information on a trunked radio system used by the Postal Service in New York City. Recently received information seems to indicate that the Postal Inspectors are using that system for their communications in the New York City area. If anyone who regularly monitors this system can confirm this, please let us know at the *Fed Files*!

❖ Agency Close Up: Immigration and Customs Enforcement

One of the new federal agencies that came into existence after the formation of the Department of Homeland Security is the Bureau of Immigration and Customs Enforcement, popularly known by the acronym "ICE," www.ice.gov/.

United States Immigration and Customs Enforcement is the largest investigative arm of the Department of Homeland Security and is involved in law enforcement issues ranging from terrorism threats to gang activity, border



U.S. Immigration and Customs Enforcement

smuggling and intellectual property rights. ICE is organized into four main divisions: Office of Investigations, Office of Detention and Removal, Office of Intelligence, and the Federal Protective Service. I've covered the Federal Protective Service radio systems in past *Fed Files* columns in more detail.

As far as radio systems go, Immigration and Customs Enforcement divisions appear to be using many of the frequencies of the legacy radio systems that were in place before the formation of the DHS. Some of these systems are using frequencies also used by other DHS agencies, such as Customs and Border Protection (CBP). Don't be surprised to hear ICE operations using some of the CBP radio channels; however, I have not been able to pin down a good listing of ICE call signs that might be heard on the CBP radio nets. You

can find a listing of the CBP radio nets in the September 2004 *Monitoring Times* or on the *Fed Files* blog:

http://mt-fedfiles.blogspot.com/2006_05_28_mt-fedfiles_archive.html

But here is a "best guess" at VHF frequencies assigned specifically to ICE operations:

162.0500 162.6125 162.8250 162.8500
162.9250 163.1250 163.2250 163.6250
163.6750 163.7000 164.1000 164.3000
164.3250 164.6000 164.7750 164.8625
164.9625 165.2375 165.3250 165.3375
165.4125 165.4375 165.4625 165.4875
165.5125 165.6375 165.6875 165.7375
165.7625 165.9500 165.9750 166.1250
166.2000 166.2250 166.2750 166.3000
166.3750 166.4375 166.4625 - DHS
COMMON 166.4875 166.5375 166.5625
166.5875 166.6000 166.6750 166.7375
166.8750 168.0000 168.9750 169.5500
170.1000 170.2000 170.6250 171.5000
172.3500 173.5000

Give these a try in your scanner and let us know what you hear!

That's all for this month's *Fed Files*. We'll have more frequencies and federal monitoring information for you in March!

❖ Listener Report from OKC

I recently received a nice message from *Fed Files* reader Scott in Oklahoma City, Oklahoma, that included his federal frequency logs and I thought I would share it with the *Fed Files* readers:

OKLAHOMA LISTENER LOGS

162.7375	167.9 pl	FBI (DES encryption, probably simplex or input)
162.7875	136.5 pl	US Marshals Service (Federal Courts)
163.2000	136.5 pl	US Marshals Service, Ch 1 (repeater in 163.8125)
163.2000	136.5 pl	US Marshals Service, Ch 2 (simplex)
164.6000	136.5 pl	US Marshals Service, Ch 3 (repeater)
164.6000	136.5 pl	US Marshals Service, Ch 4 (simplex)
165.2375	100.0 pl	DHS Customs Net 1 (repeater in 166.4375)
165.2375	100.0 pl	DHS Customs Tac 1 (simplex)
165.7250	P-25	US Marshals (input to 170.750 repeater)
167.5125	167.9 pl	FBI
168.2750		Unknown (DES encryption)
170.7500	P-25	US Marshals (Federal Courthouse Security)
409.9625	P-25	Unknown Agency
410.0000	100.0 pl	Postal Service (maintenance)
410.2500	141.3 pl	FAA (Mike Monroney Aero Center - Security Alternate)
410.8250	173.8 pl	Unknown agency
411.3750	036 dpl	Unknown agency (DTMF tones, possible NOAA control of tornado warning sirens in the OKC area)
413.8250	100.0 pl	Postal Service
414.7250	100.0 pl	Postal Service (Morse ID = USPSOKC2)
415.2000	103.5 pl	GSA (federal building security)
416.4250	141.3 pl	FAA (Mike Monroney Aero Center - Maintenance)
416.8750	141.3 pl	FAA (Mike Monroney Aero Center - Security Primary)
417.2000	CSQ	GSA (federal building maintenance)
417.7000	114.8 pl	Postal Service (Postal Inspectors - IDA units)
418.9500	156.7 pl	DEA
418.9750	156.7 pl	DEA
418.9750	156.7 pl	DEA (simplex)
419.1500	100.0 pl	Unknown agency
419.4000	136.5 pl	Unknown agency

Thanks very much for the nice list, Scott. It appears that Oklahoma City federal agencies have not jumped completely on the P-25 digital bandwagon yet, as most of your list still shows analog modes being used. A couple of notes on Scott's list: The Federal Protective Service that is in charge of federal building security is no longer part of the GSA (General Services Administration). The FPS is now part of Homeland Security, specifically Immigration and Customs Enforcement or ICE (see the next section for more info). The GSA is still in charge of federal building maintenance, however. Also, 419.1500 MHz has been used as an input frequency for the FPS repeaters on 415.2000 MHz and 417.2000 MHz, so I would suspect that might be the case in OKC.

Do you have a list of favorite federal frequencies in your town that you would like to share with the *Fed Files* readers? Please send them to us at *Monitoring Times*, either by e-mail or snail mail and we'll pass them along.

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Kevin Carey
P.O. Box 56, W. Bloomfield, NY 14585

Winter, Waves and Wireless

"This is Seaway Sodus, what is the weather in your area?"

"The winds are 50 knots plus and the waves are running 20 feet."

This chilling weathercast was from a ship near the Main Duck Islands on Lake Ontario. The forecast was correct and we had "Storm Warnings" up for 48 hours near the end of October. Cold temperatures, snow, rain, and a wave period of just 8 seconds show how fierce the famous Gales of November on the Great Lakes can be. I was happy to be in the radio shack where it was warm and I could monitor the traffic.

We had five large vessels (the largest being 740 ft long and 78 ft wide) that waited for the weather to abate before even venturing out onto Lake Ontario. Waves in the river prevented the pilot boat, which monitors channel 14, from getting to the ocean vessels for about 36 hours. Many vessels were looking for a lea all over the Great Lakes area. Some of these were 1000 feet long and carry 50,000 tons of cargo.

❖ Antenna Work and Autumn Reception

The storm also served as a reminder to me that any radio or antenna work must be done quickly before the hated four-letter word "SNOW" becomes a daily expression. Once the homestead is buttoned up for winter, one can look to the radio equipment for a winter tune-up.

With the help of George, VE3GHK, who has been a shortwave listener and amateur radio colleague since the 1960s, we put the final touches on my feedlines and antennas. New RG-213U coax cable was fitted to the R-8 vertical, 80 meter coaxial dipole and dual band VHF/UHF vertical. We also installed an Alpha Delta DX-B sloper antenna, balun, and new cable. This antenna is only 40 feet long, but does load on the 160 meter amateur band. I am also impressed by its reception of the low frequency marine radio bands.

At this moment, CAMSPAC Point Reyes, California, (5696 USB) and CG 1713 are coming in at S-9 strength on my R-5000 receiver. (CG 1713 was at 07 30 N, 81 43 W.) Cables to the two discone antennas and two marine band vertical antennas were shortened and repaired. A new 6 dB gain marine vertical was also added along with some new cable.

These antennas feed my TS-470, Racal 6778B, Yaesu 897 and two R-5000 receivers for HF. Two scanners (one digital), a two meter mobile, and a new digital selective calling (DSC) marine radio are used for VHF monitoring.

As previously stated, I am impressed with the reception from the improved system. The sloper seems to be particularly effective on the low frequency marine bands. I have had strong signals from Halifax, Labrador, Sydney, Placentia, St. Anthony and Fundy Coast Guard radio stations on 2182 kHz USB. I have also heard their weather broadcasts on 2598 and 2749 kHz respectively. Some US Coast Guard (USCG) traffic on 2182 and 2670 kHz has also been copied.

The R-8 vertical, the tip of which is about 50 feet in the air, has also given excellent results. Besides being good on the 40 through 6 meter amateur bands, it has been quite a surprise on the HF frequency marine bands, even 2 MHz. It outperforms my dipole on these bands. USCG signals on 5696 and 8983 kHz USB have been excellent. I have also heard USCG traffic on 5732 and Canadian Search and Rescue traffic on 5717 kHz. Bermuda Harbor Radio weather broadcast on 2582 kHz at 0035 UTC has been heard regularly as well. VFF Iqaluit, on Baffin Island, has also been heard on 2582 kHz.

My VHF monitoring has also improved. Besides Seaway Clayton and Seaway Sodus, Seaway Newcastle and Seaway Iroquois have been heard on a more consistent basis. The annual rush to leave the Great Lakes before winter by ocean ships and the fall grain rush for lake ships have caused a significant increase in traffic. As a ship enthusiast, I recognize the names of many of the ships and the radio traffic gives interesting information. For example, the *Jo Spirit* has departed Hamilton, Ontario, recently for the Caribbean. This large tanker comes here several times a year and carries nothing but high proof rum. I do not drink myself, but needless to say the ship is a favorite for the pilots.

We have had several groundings and some mechanical failures in the Seaway over the past two months. Channels 11, 12, 13, and 14 are used for traffic control in the Seaway. By the way, the little-used channel 17 is used for communications as the ships are spotted in the locks. As this is being written, channels 16, 82A and 24 have been alive with a Mayday call from an unidentified vessel. VBR Prescott has been contacting local ferries, etc., while USCG Sector Buffalo has been broadcasting the mayday.

Here is a typical monitoring log on the 8983 kHz USCG frequency:

UTC	Traffic
1521	CAMSLANT Chesapeake to CG 2139 operations normal position 44.37N, 086.44W
1530	CAMSLANT to CG 2134 operations normal
1535	CAMSLANT to CG 1735 on final approach

2013	CAMSLANT to Rescue 2102 "do a six mile sector search over last known position" Communications with CG 2133, Stingray 05, CG 2102 and 1503
2115	CAMSLANT Chesapeake to CG 2127 on scene with vessel Dreamcatcher, no Coast Guard assistance required as they have a healthy crew and sound vessel. On scene weather overcast, 4000 scattered, minimal precipitation, wind SE 20 knots, 10 foot seas. Aircraft instructed to return to base.
2120	CAMSPAC Point Reyes California to CG 1713.

There is always some traffic to monitor and the aircraft are usually heard well here. I am looking forward to winter monitoring as the shorter daylight hours give better HF propagation on the low bands.

❖ Unexpected Surprises

It should be noted that CAMSLANT does not have a VHF radio guard but only monitors the HF GMDSS distress frequencies and Coast Guard HF frequencies. 8983 is the daytime primary and 5696 is the nighttime primary frequency.

However, you never know where these stations will show up. One of my favorite frequencies is the Maritime Mobile Service Net on the 20 meter amateur band. 14300 USB produces some excellent marine monitoring and the added bonus is that I can often contact the ships through an onboard amateur radio contact. KE7CIW/mm was in the central Atlantic Ocean and could not copy the control station. I was able to relay for him and got a station to make a phone patch for the vessel.

In Sept, I checked in with Bernie, NP2CB, and said I was monitoring the net. To my surprise, his next contact was a relay to me from my brother Bert, VE3KBW, who was in his RV in Algonquin Park. You never know who will be on a radio!

An excellent catch was AG6E aboard the Research Vessel *Knorr* from the Woods Hole Oceanographic Institute. The ship was between Baffin Island and Greenland when I contacted David. He was actually testing his GMDSS HF marine equipment on the amateur bands. Not surprisingly, a QSL card is on its way to him. People will also recognize this vessel from the search for the *Titanic*.

A surprise visitor to 14300 was CAMSPAC Point Reyes California. They actually came up on this amateur frequency to try to contact a yacht that was taking on water and had been supplied with a pump. Any frequency can be used in an emergency. This frequency is also used for the Pacific Seafarers Net daily at 0300 UTC, and Saturday mornings at 1700 UTC, the USCG amateur radio net meets on 14300. KE7A and W6FO run quite a net for people connected with the USCG.

They have 682 members at this time.

3755 kHz LSB is the ONTARS radio net and I often chat with my friend Ron, VA3RJB, on the freighter *Algosteel*. He was on Lake Huron during our latest storm and they had to wait for weather there.

The last good catch was during the CQ WW SSB contest. I was working some contacts on various bands and went to 15 meters. At 1943 UTC on **21318 kHz**, I contacted JT1FG/mm in zone 8. When I asked him what vessel he was on, he said the "*Greenwing*." I have heard that ship many times on the VHF radio, and he said they would be in Windsor in two weeks. Right now I am monitoring the radio and checking the internet Seaway site to see when the ship enters the system. I hope to at least get a picture of the vessel or meet the amateur operator. Just another good example of how radio monitoring helps other hobbies.

❖ Caribbean Frequencies

I am presently looking to see what Caribbean marine HF I can monitor. As I previously stated, ZBR Bermuda Radio broadcasts on **2582 kHz USB** at 0035Z and every 4 hours thereafter. They also monitor **2182** and **4125 kHz** at all times. **4384** has also been listed as active from Bermuda. Their weather broadcast is also on weather channel 2, **162.400 MHz**, on a continuous basis (a good reason for taking a weather radio when traveling). Watch for an upcoming feature article on my visit to ZBR and its very competent personnel.

I have a list of marine frequencies from The Jamaica Amateur Radio Society. **2182 kHz** and **2527 kHz** are used for marine emergencies. **4429**, **8765** and **13113** are listed for communications with USCG station NMN. **8294** is also listed for Marine use. **6977.5** is listed for meteorological stations. The Jamaican Defense Force (their Coast Guard) lists the following frequencies: **1314, 2587, 2738, 3535, 4369, 4402, 4429, 4438, 5696, 6513, 8752, 8984** and **15462 kHz**. I would appreciate any reports of these frequencies being active. (**6513** is also used by Canadian Arctic Coast Stations.)

As for VHF, they monitor channel 16 for distress, and use channel 13 as a marine working frequency. The Kingston harbor pilot uses channel 11, while the local sport fishermen use channel 68.

I have noted a lot of listings for **2760 kHz** in Cuba and **2738 kHz** in South America.

My research shows the following active stations. All frequencies are in kHz and are SSB.

Call	Station	Freq kHz SSB
WAH	St. Thomas, Virgin Islands	2506, 2585
C6N2	Nassau, Bahamas	2552, 2558
C6X2	Marsh Harbor, Bahamas	2582
CKLZ	Santa Cruz de Sur, Cuba	2522
WCT	Mayaguez, Puerto Rico	2530
FFP	Fort de France, Martinique	2545
CLA	Havana, Cuba	2582, 2711.5
8PO	Bridgetown, Barbados	2582
6VI	Kingston, Jamaica	2587, 2590, 4369, 4402
JCG	Kingston, Jamaica	2738
	Port au Prince, Haiti	2738
HPP 20	Panama	2740, 4436, 4426

I would appreciate any reports of these or other active frequencies you monitor. I will also be DXing this winter and will use all our reports

in future columns.

A good example of useful reporting comes from Greg Jackson of Canton, Ohio. Greg states that he uses two Icom R-75s attached to an Alpha Delta sloper and a par end fed antenna. He also states the sloper is quieter on 5 MHz and lower. He reports that **6215 kHz USB** is active with mention of the Caribbean. **4215, 4146** and **4149** are also heard in Ohio. Thanks, Greg, and I also appreciate your positive comments on the column.

❖ Other DX Items

Again I remind West Coast listeners to tune to **2054 USB**, used by NOJ Kodiak Alaska, VAE Tofino, BC and VAJ Prince Rupert, BC. I also noted some listings for Tors Cove NFLD on **2445, 4360** and **6567 kHz**. If you want some Pacific stations, I have listings for Papeete, Tahiti, on **4402**; many Australian stations on **4146**; and Tenerife on **2606**. Intership frequencies of **2632, 2638** and **4146** could be interesting. I can see the old earphones will get a workout this winter.

❖ Rescue 21

This is the name for the USCG's program to implement Global Maritime Distress and Safety System (GMDSS) operations. Although we usually only think of DSC when this is mentioned, there is a lot more to the \$730 million dollar project.

This new system will include direction finding improvements. A network of towers will fill in the 88 known gaps in radio coverage along the coastline to allow more accurate locating of distress situations as well as locating hoax distress calls. Between 2003 and 2005 the USCG estimates they responded to 500 hoax distress calls. This cost them 40 days of search time and over 3.1 million dollars. I teach boating safety courses and marine radio license courses, so I always caution people about false Mayday calls. Saying "Mayday" on a radio is taken seriously by all emergency services. People do not believe me when I say Maydays have been issued because someone was *out of beer*. However, the USCG article says the same thing.

Also, software will improve radio transmission quality and allow rapid replay of distress messages. Also included is a Disaster Recovery System (DRS) package. This is a fully deployable communications system which can be set up if a disaster wipes out communications in the disaster area.

The new system showed its mettle when George Strawn's boat capsized 4 miles off Ocean City, MD, in November 2005. This man had already survived a 1957 catapult explosion that killed 103 crewmen on the aircraft carrier *USS Bennington*. He now thought his life was over as he clung to an ice chest. He had issued a Mayday to the Coast Guard; however, they had been given an incorrect position. Using the new Rescue 21 equipment, the Coast Guard went to his exact position. Hypothermia was not far off when Mr. Strawn and his two companions were brought aboard the Coast Guard. This was the first rescue in the nation using the new system. Rescue



21 has been put into use along the East Coast and Gulf Coast of the United States this June. The first Pacific Rescue 21 station went into Seattle this past September.

The new DSC marine radios are also connected to a global positioning system radio so that when the digital Mayday is sent, an accurate position is also sent. If you do not have a GPS radio, a position must be manually entered into the radio at least every 4 hours.

Another GMDSS device which has saved lives is the EPIRB (Emergency Position Indicating Radio Beacon). When activated, this device sends a distress call on **406 MHz** which is captured by satellites. You can then locate the beacon within a few feet. A story from Brisbane Australia tells of a vessel that was burglarized and then had its interior burned to remove clues. The owner was repairing the vessel on shore and found a heavily burned, melted EPIRB. He threw the device on a pile of scrap equipment, figuring it had been destroyed as well and went to sleep. That night, he was awakened by a strong light and loud speaker from a low hovering helicopter. They asked if the man was safe as there was an EPIRB activated near him!

Locally, we have actually had an EPIB activated when a yacht was being towed down the major four-lane highway. Not only did they locate the vehicle and stop the EPIRB transmitting, the man was informed he was speeding as determined by the EPIRB transmissions. The device works but can also cause unneeded false distress calls if not checked.

Another example of the efficiency of this device: a yacht collided with another yacht off Hawaii at 0735. The people abandoned the boat for their life raft at 0815. They were spotted by an aircraft at 1055, which circled until a vessel could be sent to help.

❖ Marine Radio Historical Society

Richard Dillman keeps me up to date about this organization and their historic station KSM. They have been granted two RTTY (Narrow Band Direct Printing) frequencies by the FCC – **8433** and **12631** with a power of 5 kW. Anyone wanting a great Racal RA 6790/GM receiver can get one from the MRHS for \$300 plus shipping. You can get the details at their website www.radiomarine.org.

Their KPH station has been active on **500 kHz CW** and sends bulletins on **426 kHz CW**. I am still trying to hear those transmissions here. Someday I will have the propagation. Their amateur station K6KPH is usually on **2550, 7040** or **14050 CW** to receive reports. QSL cards are issued by all stations. Again, their website has details and you can be placed on their email list.

Tips from Kevin for 2007

What comes to mind when you think about longwave? Static? A few local beacons? Repetitive IDs? If so, you are among the majority of listeners today. When I tell fellow hobbyists about my work on longwave, they often respond with blank stares or questions like: "Can you really hear anything down there besides static?"

For the few who've given the band a fair try, the reactions are often quite different. They know the variety of signals that can be heard there and the exciting propagation styles of the band. My goal in this month's column is to encourage newcomers to check out the band for the first time. Mid-winter is a great time to dip below 500 kHz, and what better time to begin than at a New Year? Atmospheric static is gone from most areas, and the long periods of darkness promote DX from late afternoon on.

❖ Tips and Resources

If you're just starting out, you'll want to get a listing of longwave beacons before going too far. While you can identify some of the beacons by looking through back issues of *MT*, this becomes more difficult as your list begins to grow. There are some Internet sites that can help you identify beacons – www.nav aids.com is one place to start – but I've yet to find a single website that lists all U.S. and Canadian beacons. In some cases, the crucial two-letter "compass locator" beacons are omitted, or a site will focus on one country or another.

While websites can be helpful tools, I prefer to have a *printed* booklet handy for serious DXing. Besides, who wants to have a potentially noisy computer running next to their receiver when trying for an elusive 25-watt beacon four states away? If you are interested in a printed guide, I encourage you to check out the *BeaconFinder II*, which I began publishing for hobbyists in 1998. Now in its 7th printing, it lists the majority of longwave stations that can be heard in North America. You'll find the guide listed elsewhere in this issue of *MT*.

Here are some additional tips for success on longwave, listed in no particular order:

1. Tune slowly to avoid missing signals! Beacons are usually assigned to 1 kHz intervals. If you tune too fast, you might skip right over some good DX.
2. When trying for distant beacons, use your receiver's BFO or CW/SSB setting. You'll find it much easier to sort through weak signals by "zero beating" their carriers and listening to the keyed Morse ID.
3. Use a narrow bandwidth setting. A narrow filter (500 Hz or less) will go a long way toward blocking

out adjacent "pest" signals.

4. Use a good set of headphones. They will help you focus on weak signals, and avoid disturbing others around you.
5. Use a loop or active antenna specifically designed for longwave. Despite their small size, these antennas often outperform "longwire" types, and almost always provide quieter reception.
6. If possible, turn off static-producing appliances such as TV sets, computers, dimmer switches, electric motors, fluorescent lights, etc.
7. When DXing in the winter, Cuba, South America, and the far north of Canada are all reasonable targets. Many beacons in these areas run high power and stand out from the crowd.

❖ What I Use

From time to time, readers ask me what I use for listening to longwave. Much depends what part of the spectrum I'm listening to, and what my goals are for a particular session. For general-purpose work from 100 to 535 kHz I use a Drake R8 receiver. The audio quality, adjustable notch filter, and narrow bandwidth setting make the R8 ideal for all around DXing.

If I'm feeling nostalgic, I'll fire up my old National RBL-5, a WWII vintage receiver weighing in at 80 pounds. This is a regenerative set, so it takes some fiddling to get a station tuned in. Once you get the hang of it, though, it can hold its own against many of today's newer rigs. It covers 15 to 600 kHz.

For casual DXpeditions, I often grab my Sony ICF-2010. A friend encouraged me to buy one of these years ago, and I'm glad I did. The '2010 provides about 90% of the features I could ask for in a longwave receiver, and you can't beat the convenience of a portable set for on-the-road listening.

I typically use two types of antennas at home – a 250-foot random wire and an LF Engineering L-400B active antenna. I switch between the two for the best signal-to-noise ratio. When I'm

interested in direction finding, I use a homebrew tabletop loop that tunes from about 175 to 600 kHz. This antenna was described in the September 1992 edition of *Below 500 kHz*. Finally, for portable work, I use a Q-Stick Ferrite antenna that can be tuned across the LF/MF bands. It works by coupling to the '2010's internal antenna. No hardware connections are required.

As you can see, my lineup does not include anything truly exotic. I believe the best tools for monitoring success are patience, a good antenna, and some experience in tuning the band. As I often say, knowing *when* and *where* to tune for signals is worth at least 10 dB.

❖ Loggings

John Tucker, KG7RS (Arizona) contributed the loggings shown in Table 1. He writes: "As a new *MT* subscriber, I thought I'd contribute to the *Below 500 kHz* column. The following are my loggings from Mesa, AZ, near Phoenix. All loggings are from October 18-22, 2006. My equipment is a Drake R8B receiver and LF Engineering L-400B antenna. I'm amazed how easy and enjoyable it is to DX these NDBs. YPL and DDP amazed me, but the ID was unmistakable on both!"

Thanks for a great list of loggings, John. Welcome aboard, I hope we'll hear from you often.

FREQ.	ID	LOCATION
206		GLS Galveston, TX
207	AEC	Warm Springs, NV
220	RBJ	Tucson, AZ
242	EL	El Paso, TX
251	AM	Amarillo, TX
260	AP	Denver, CO
275	GUY	Guymon, OK
326	MA	Midland, TX
329	TAD	Trinidad, CO
335	CVP	Helena, MT
338	PBT	Red Bluff, CA
344	FCH	Fresno, CA
353	LWT	Lewistown, MT
359	BO	Boise, ID
364	AA	Fargo, ND
365	HQG	Hugoton, KS
368	SIR	Sinclair, WY
371	TVY	Tooele, UT
373	TF	Pueblo, CO
380	BBD	Brady, TX
382	YPL	Pickle Lake, ON
383	CNP	Chappell, NE
386	SYF	St. Francis, KS
391	DDP	San Juan, PR
394	ENZ	Nogales, AZ
400	FN	Ft. Collins, CO
400	ENS	Ensenada, MEX
403	AZC	Colorado City, AZ
404	MOG	Montague, CA
413	OEG	Yuma, AZ
414	SKX	Taos, NM
512	HMY	Lexington, OK

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Well, I guess they have to keep them somewhere! (Recent ad seen in a weekly shopper)

FM Pirate Activity Continues Despite Busts

Despite a series of regular busts by the Federal Communications Commission, numerous local FM pirates continue activity across the United States. One of these, as reported by the Chicago *Sun Times* via Kevin Mikell, broadcasts "gangsta" rap on 90.5 MHz from East Chicago, Indiana. The Associated Press reported in October that an all-time record 185 FM pirates were busted in the United States by the FCC during only the first nine months of 2006. According to the AP report, the bust total was 151 in 2005, and "only" 92 in 2004. Yet pirates continue to pop up on the United States FM band in obviously large numbers, nevertheless.

One of the recent busts, as reported by the Tampa *Tribune* in October, was levied against Haitian native Marjorie Voltaire of northern Tampa. She allegedly broadcast Creole music on 89.3 MHz. She was arrested on a search warrant delivered by FCC personnel and Hillsborough County sheriff's deputies on October 13. She was charged with unauthorized transmission of a radio broadcast, a third degree felony under Florida state law, and was held in a Tampa jail on \$2,000 bail. The authorities also seized \$10,000 worth of equipment including a transmitter and antenna.

Also fined by the FCC in October was William Stephen Major of Sacramento, CA. He was accused of operating an FM pirate **KNOZ** on 95.6 MHz in Sacramento. The FCC upheld his \$10,000 fine, even though Major claimed that he was not responsible for the pirate, and that he was filing an application for a broadcasting license.

❖ Not DXers

Winter SWL Festival maven Richard Cuff sends in an item from **WNEP-TV** in Scranton, PA. The station reports on a recent bout of DX graffiti crimes in Lock Haven, PA. Fortunately, the mischief-makers are not misguided shortwave DXers, but fans of "Degeneration X" professional wrestling.



❖ Borowitz on Pirates

In early October, well known political satirist Andy Borowitz headlined his comedy column with, "In New Poll on Ethics, Public Ranks Congress Lower Than Pirates; Bloodthirsty Bandits of the High Seas 'Twice as Trustworthy' as Lawmakers, Survey Says." He followed that up with a lead sentence of "In a troubling omen for the upcoming midterm elections, a new poll on ethics released today indicates that the public for the first time ranks congressmen lower than pirates."

Of course, Borowitz actually makes up his political satire material. It is available daily on the internet at the www.borowitzreport.com/default.asp URL.

❖ Crystal Ship QSLs

The Poet, the driving force at **The Crystal Ship**, has announced that although he will continue to honor first time reception reports via his e-mail address, he prefers reception reports via his Belfast maildrop, along with three first class mint stamps for the maildrop forwarding.

DXers should realize that pirate station operators do not have a large budget for sending out QSLs to listeners who send in reports via e-mail. Therefore, this is good advice for all your reception reports. While pirates love to hear from listeners, receiving a QSL is more likely if the listener helps defray the postage cost.

❖ Pirate Beacons

A subculture of unlicensed broadcasters that normally gets little coverage in the DX press are beacons. They broadcast Morse Code CW beacons on a variety of frequencies between 4080 and 13528 kHz. Some may be pirates and some may be simply experimental (see *QSL Report* page 38). If you want to try for these, the best current list of targets is up on the internet at the www.spynumbers.com/USSWbeacon.html URL. We thank veteran Europirate expert John Campbell for the tip on this one via *DXplorer*.

❖ What We Are Hearing

Monitoring Times readers heard two dozen different North American pirates this month. You can hear them, too, if you use some simple techniques. Pirate radio stations never use regularly announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. Christmas and New Years are the biggest pirate holidays of the year. You sometimes have to tune your dial up and down

through the pirate radio band to find the stations, but more than 95% of all North American shortwave pirate broadcasts are heard on **6925 kHz**, plus or minus 30 or 40 kHz.

Happy Halloween- This one joined the ranks of pirates with holiday themes this fall. (None)

James Bond Radio- They play music themes from James Bond movies, while giving IDs only as "Bond, James Bond." (None)

Global Radio Journal- This new one is apparently a relay of reporting from a news service. (None announced)

MAC Shortwave- Their professionally produced top 40 rock format used to be a staple of old medium wave AM radio. They still sometimes use 6851 kHz, but sometimes they hang out on 6925 kHz. (Uses macshortwave@yahoo.com e-mail)

Northwoods Radio- Using a slogan of "broadcasting from the Great Lakes" and loon bird call noise interval signal makes this rock music station distinctive. They have been QSLing. (Uses northwoodsradio@yahoo.com e-mail)

Numbers Parody- Phony pirate numbers stations are back. Recent versions have just read numbers, not the Mexican foods or sexual terms that sometimes have replaced the numbers in the past. (None)

Partial India Radio- With maybe the best pun identification in shortwave radio today, Sanjay Ghandi concentrates on pirate radio humor. (None current)

Possum Hunt Radio- This new one discusses a banquet of road kill being prepared by the announcer's brother. (None)

Radio First Termer- Replays of this commemorative program about rock music broadcast to USA troops during the Vietnam war are still heard on the pirate band. (None)

Radio Free Euphoria- Captain Ganja's flagship station features rock tunes with the lyrics altered by inserting pirate radio characters. (Belfast)

Radio Free Speech- Bill O. Rights is back with his advocacy for individual freedom mixed in with pirate humor and rock music. (Belfast)

Radio Is My Friend- This mysterious pirate talks about the sad case of Graham Conner at the Cherokee Insane Asylum in Iowa. It has returned to the air, but we know little about it. (None)

Radio Paisano- This new station has been broadcasting rock music. (None announced)

Robot Radio- The computerized voice on this one sings tunes and reads Shakespeare. (None known)

Take It Easy Radio- Their namesake theme song is still by Joe Walsh and the Eagles, but they also play other rock. They went out of character in October by questioning the Iraq war during one show. (Merlin)

The Crystal Ship- The Poet at the "Voice of the Blue States Republic," normally programs classic rock and leftist political commentary on highly variable frequencies such as 1710, 3320, 3346, 3275, 6875, 6854, 6925, and 9057 kHz. (Belfast and uses tcshortwave@yahoo.com e-mail)

Touch Tone Radio- Their distinctive IDs are laced with tones from a telephone dialer. The programming is generally a complex mix of rock and new age music. (None)

Undercover Radio- A recent Dr. Benway broadcast was announced as coming from a rural

Continued on page 61

Something Old, New, and a Few Dogs, Too

Let me tell you about my dogs. These days I have two: Sherman, a mixed breed with a lot of Rhodesian Ridgeback in his soul, and Molly, an American Eskimo. Both are rescued dogs, although Molly's rescue was from a three bedroom Manhattan apartment (long story). And I would be remiss if I did not mention my "Granddog" Halley, a Beagle who joined the pack when Number One Son moved back in recently.

I never went looking for dogs in my life. They always sort of found me. Dogs will do that if you open your heart. My life has been roadmarked with many such wonderful canine friends.

Okay, so what does this have to do with ham radio? Well, I never have to be asked twice to talk about my pets, but there is a connection. Just as dogs have always found me, recently, a transceiver found me. I didn't intend to add it to my shack, but it wormed its way into my life in a way quite similar to my dogs.

❖ Enter the Icom IC-730

Another bit of a story leads to this radio... My brother-in-law is a blue water sailor. He has collected boats over the years sort of like I have collected radios and, of course, dogs. His most recent purchase had, among other neat toys, an Icom IC-730 on board. He had no use for it because he has other radio plans for this vessel. In spite of my best efforts I have yet to be able to get him to sit for his amateur radio license. He asked me if I could sell the transceiver for him through ham radio channels. I agreed to the task, never really expecting to do much with the unit other than to test it, clean it, and flog it on E-bay. Since my tastes tend to run toward QRP operation, I didn't expect to have much use for a QRO transceiver. Little did I know.

While I was waiting for the transceiver to arrive in the post, I did a bit of research. I tracked down a picture and basic specifications at www.rigpix.com, a great Web site for getting a quick look at almost any ham radio rig you can think of. I learned that the IC-730 was sold throughout the early 1980s and was a transitional WARC band unit (more on this later). Like many radios in this class, it runs off of 13.8 VDC, making it good for shack or mobile use. Unlike some of the other units in this era, it is capable of AM transmission

as well as SSB and CW, but alas, no FM mode. Also, no 160 meter or general coverage receive mode. The site also had a download of the manual for me to peruse. There are a number of resources that will be happy to sell you manuals for older gear, but I have discovered many resources on the Internet with the only price being a bit of burned bandwidth.

The manual gave me more useful information. The 730 is capable of transmitting 200 watts input drawing 20 amps. The final is solid state. All other specs were within reasonable limits. The unit has a CPU based frequency synthesizer; digital tuning was fairly new in the '80s, so this must have been really exciting stuff that we now take as commonplace and even expected.

The receiver section is quadruple conversion with passband tuning. The unit is capable of independent transmit-receive frequency control, so there is no need for an outboard VFO to work splits when chasing DX. Frequency memory backup requires an outboard power source. Not all that unusual in that era. It should be a good journeyman HF transceiver if the rig winging its way to me is in good condition.

I did a bit more Web browsing to see what else I could learn about the IC-730. www.eham.net had a number of positive reviews with an overall rating of 4.8 out of 5 and a recommended price in the range of \$275. I read reports from many folks who bought the rig new in the '80s and continued to be impressed with it enough to either continue to use it or keep it as a spare around the shack. There were lots of positive comments about how quiet the receiver was and the rig's ability to chase DX with the big boys.

A couple of notable problems also were discussed on eham.net and at several other forums. These matters required only simple fixes, all within the skill level of any ham not afraid to lift the lid and melt a little solder. The biggest issue was the preamp relay fail-

ing. If this becomes inoperative you have two choices: replace the relay or turn up the gain. The second is obviously less expensive.

Problem number two is a need to upgrade transistor Q5 on the RF board. If the factory part is a 2SC945Q, it should be swapped out with a 2SC2878B to eliminate spurious output and possible failure of the driver transistors. Sounds like good advice if needed.

The only other matter of significant concern is a need to resolder the connectors at J2 and J3 on the RF board. These solder points are fairly large and are prone to cracking.

Beyond that, there doesn't seem to be anything a well-cared-for unit should need, other than a few sprays of contact/tuner cleaner on the pots and a check to see all the fasteners are tightened down.

Remember I mentioned that the rig was transitionally WARC capable? As originally shipped, 12, 17 and 30 meters are on board but only in receive mode. To be able to transmit on those bands, a minor modification in the way of cutting a specific wire on the RF board is required. My guess is that the 730 was designed during the opening of those excellent ham bands to the amateur radio community, but they probably had to be initially shut out in transmit mode to meet type acceptance. Once the band privileges were granted, one quick snip and the owner was able to join in the fun. The procedure is even mentioned in the IC-730 manual on page 23.

The IC-730 arrived and went onto the bench and I found everything in working order. The rig's power was a full 200 watts as advertised and it could tolerate a 15% power fluctuation (also in spec) — important when operating mobile or portable from an alternate power source. The previous owner had already "opened" the rig for WARC usage. The transceiver also appeared to have a newer preamp relay and the 2SC945Q was swapped out as well, so there were clear signs that this previous owner cared enough about the rig to update it as recommended.

One more or less tolerable minus: it was fairly clear that this owner was a smoker. I have run across this type of thing before. It is mostly a nuisance. This rig was going to require a bit of cleaning if it was to fetch its best price. If you feel the need to clean a piece of equipment, be sure to seek out low solvent cleaning solutions designed for



electronics equipment.

Well, that was going to be the end of it for me, but I couldn't resist taking the rig up to the shack and working a few QSOs with it. As others had mentioned, the receiver made a very good impression. In these times of bad band conditions, a good, quiet receiver is worth its weight in gold. So I ran the rig up to the SSB portion of 80 meters (it was late at night) and found the 200 watts had good range. I didn't have to work nearly as hard to be heard as when I was playing QRP. A QSY down to the Extra portion of 40 CW showed that 200 watts is all the reach anybody would ever really need.

As I played, I got very comfortable with the control layout. I started to think this would be a good replacement for my very well-used and long in the tooth Ten Tec Triton IV. I repeat that I am a confirmed QRP person, but I have always felt the need to keep a higher powered rig in the shack because, in times of emergency communications, I want to be heard. In emergency situations, radio stops being a sport and starts being a duty.

So, I decided to cut a deal with my brother-in-law. I had been thinking of building the 100 Watt module for my Elecraft K2, but this turned out to be a less expensive way to go. It also left enough money in my radio budget to indulge in another addition to the shack to help the IC-730 get the job done.

❖ Tuning Around with the AT-200Pro

I placed an order for an LDG Electronics AT-200Pro Automatic Antenna Tuner (www.ldgelectronics.com). I built ATUs into my Elecraft K1 and K2 rigs, and I got very spoiled by their ease of use. The IC-730 was a step up in RF tune-up, frequency tuning speed, and ease of use from my older Ten Tec, so fiddling with a manual antenna tuner became a bother. I was planning to use this rig for DXing and contesting. My contest operating style has always been hunt and pounce. The ability to tune around quickly and chase the DX spots would be supported by a good ATU.



LDG has been in the tuner business for a little over 10 years now and their product development over that time has been consistent and responsive to ham needs. Their basic design uses banks of capacitors and inductors, switched by relays controlled by a microprocessor. The standing wave ratio (SWR) is sensed by a modified Bruene circuit that feeds a signal to analog-to-digital converters in the microprocessor to calculate SWR in real time; it then adjusts the LC matrix to give the lowest SWR possible with the antenna in use.

I picked this particular unit because it would service my newly acquired 200 watt IC-730 (the AT-200Pro is rated to 250 watts) and my QRP rigs with equal aplomb. Tuning time is under 6 seconds in seek mode, but can be as low as .2 second if the antenna/frequency combination is previously stored in memory. The unit's 16,000 memories allow for near instantaneous band switching. The ATU can essentially "learn" as you use it and adapts itself to your normal operating practices. This is a long way from spinning a roller inductor and tweaking air variable capacitors, hoping nothing arcs over and eats your finals!

I now had a great set-up for entering into the winter contest season. My first foray was the October CQ Worldwide DX show. It was fun to chase around using a station that allowed me to go after whatever multipliers I could find. A twist of the IC-730's dial and the autosensing mode on the AT-200Pro went to work to make my ladderline fed 80 meter dipole work without causing any additional wear and tear on my transceiver.

Admittedly, since we are just now starting to climb out of the bottom of the solar cycle, there weren't as many signals to chase as in better years, but those that I heard I could work with no trouble. Also, at this point in the cycle, the nighttime operation on 40 and 80 meters is improved, and the ability to work splits with the IC-730 with nothing more than a touch of a button made life very easy indeed when the sun went down on this side of the world. By the time you read this column, I expect I will have moved at least a few entities closer to the DX Honor Roll, thanks to this pairing of the old IC-730 and the new AT-200Pro.

Like Sherman, Molly, and Halley, I hope the IC-730 will be around my shack for a long, long time. It has already proved itself to be a faithful and loyal companion.

Have fun. I'll see you on the bottom end of 40 meters.

UNCLE SKIP'S CONTEST CALENDAR

ARRL Straight Key Night

Jan 1 0000 UTC - 2400 UTC

ARS Spartan Sprint

Jan 2 0200 UTC - 0400 UTC

ARRL RTTY Roundup

Jan 6 1800 UTC - Jan 7 2400 UTC

North American QSO Party (CW)

Jan 13 1800 UTC - Jan 14 0600 UTC

Hunting Lions in the Air

Jan 13 0000 UTC - Jan 14 2400 UTC

MI QRP January Contest (CW)

Jan 13 1200 UTC - Jan 14 2359 UTC

North American QSO Party (SSB)

Jan 20 1800 UTC - Jan 21 0600 UTC

CQ 160-Meter Contest (CW)

Jan 27 2200 UTC - Jan 28 1600 UTC

ARRL January VHF Sweepstakes

Jan 27 1900 UTC - Jan 29 0400 UTC

Outer Limits continued from Page 59

fish fry. Normally he features rock music. (Uses undercoverradio@gmail.com e-mail)

United Patriot Militia Bingo- This parody of the long-busted KSMR Kentucky clandestine station has resurfaced again. (None)

Voice of Bozo- They still play rock music while discussing the Winter SWL Festival in Kulpsville, PA. (None known)

Voice of Mike Gaskin- The pirate radio humor on this one always gives phony Lakewood, OH, addresses during the broadcasts. (None valid)

WBNY- Commander Bunny at the rodent revolution still transmits a combination of clandestine parodies, digital mode broadcasts, and related pirate fare. Look for him in the spring around Easter, which is his big holiday. (Belfast?)

WDDR- This veteran rock music pirate has returned to the air after an absence of many months. (Belfast)

WMPR- When you hear techno rock "dance party" music, it normally is this one. (None; has QSLed only at the Winter SWL Festival)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA mail-drops or \$2 US to foreign locations, especially in Europe where the value of the US dollar has plunged considerably. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 69, Elkhorn, NE 68022; PO Box 146, Stoneham, MA 02180; and PO Box 293, Merlin, Ontario N0P 1W0. Unfortunately, PO Box 69, Elkhorn, NE 68022 is no longer a valid address.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletin for submitting pirate loggings with a hope that pirates might QSL is now the e-mailed *Free Radio Weekly* newsletter, still free to contributors via yukon@tm.net. A few pirates will sometimes QSL reports left on the Free Radio Network web site, at www.frn.net on the internet.

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: Skip Arey, Beverly, NJ; Kirk Baxter, North Canton, OH; Jerry Berg, Lexington, MA; Artie Bigley, Columbus, OH; John Campbell, UK; Richard Cuff, Allentown, PA; Richard Cuff, Allentown, PA; Dennis Dean, Bay City, MI; Gerry Dexter, Lake Geneva, WI; Rich D'Angelo, Wyomissing, PA; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; Nick Grace, Washington, DC; William T. Hassig, Mt. Prospect, IL; Harry Helms, Smithville, TX; Ed Kusalik, Coaldale, Alberta; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; A. J. Michaels, Blue Ridge Summit, PA; Kevin Mikell, Chicago, IL; John Poet, Belfast, NY; Martin Schoech, Eisenach, Germany; John Sedlacek, Omaha, NE; Lee Silvi, Mentor, OH; Bryan Wade, Elizabethtown, KY; and Joe Wood, Greenback, TN.

Can You Describe the Antenna You Want?

Selecting an antenna for general monitoring is often as easy as reading through a catalog, and picking what seems to us to fit our needs. Or sometimes we're outfitted just as well putting up a random-length wire. But, if we are trying to choose the most appropriate antenna for a specific, perhaps even demanding application, choosing an antenna may not be that simple. So this month let's consider some criteria to consider in selecting an antenna to fit a specific application.

❖ Bandwidth and Operating Frequency

A simple definition of bandwidth is that it is the range of frequencies across which the antenna in question functions acceptably. For instance, if you are an amateur radio operator you may want an antenna that covers all of your favorite amateur bands. However, an antenna sometimes functions acceptably only on a portion of the band to which it is tuned. Out of this range it may present an unacceptably high SWR. So an additional concern would be whether the antenna you are considering covers the portion of those bands on which you expect to operate.

Many common antennas such as the quarter-wavelength groundplane antenna, the half-wavelength dipole, and the Yagi-Uda have relatively narrow bandwidths. Usually the frequency at which they perform best is called their "resonant frequency." Multi-band antennas such as trap antennas cover multiple, but relatively narrow bands of frequencies.

Other antennas such as discones and LPDAs have very wide bandwidths. Antennas known as "non-resonant antennas" have no resonant frequency, but operate over a wide band of frequencies. Examples of non-resonant antennas include the Beverage, non-resonant long-wire, non-resonant V, non-resonant rhombic, and the T2FD.

❖ Radiation Pattern

Antenna designs differ in the way they launch and/or capture radio waves into/from the space around them. The patterning of the relative strength of these waves as they launch into space is known as the antenna's "radiation pattern." Any antenna's transmitting and receiving patterns are the same, and so the term "radiation pattern" actually refers to the antenna's response patterns whether they are transmitting or receiving.

The radiation patterns of vertical antennas show that they launch and capture waves equally in all compass directions (fig. 1A). On the other hand, beam antennas are highly directional with radiation patterns showing their launching and capturing focused mainly into one or two directions (fig. 1B). The focusing of the antenna's waves into beams (lobes) in certain directions depletes the antenna's radiation pattern in other directions. This depleting produces nulls (directions of little or no radiation or reception) in the antenna's radiation pattern (fig. 1B).

The above paragraph describes how antennas distribute their radiation patterning in horizontal or compass directions. Antennas also pattern their radiation in the vertical (ground level

to overhead) dimension. For instance, although vertical antennas tend to radiate equally in all compass directions, they generally radiate very little directly overhead (fig. 1C). Properly-sited beams tend to produce relatively low vertical angles of radiation (fig. 1D).

Note that both the lobes and nulls in a radiation pattern are useful. For reception, maximum signal strength is obtained by orienting the antenna so that its pattern's major lobe points in the direction of desired incoming signals. Similarly, for transmitting, maximum signal strength is launched in the direction of the main lobe. Conversely, the strength of noise and interference is minimized by orienting the antenna such that its pattern's nulls are in the direction of those offending signals. For transmitting, nulls can be oriented to reduce the likelihood of causing interference in chosen directions.

❖ Gain

Gain is a measure of the signal strength produced by an antenna for either transmitting or receiving. The antenna's signal output is compared to the strength which would be produced by a reference (dipole or isotropic) antenna. For directional antennas, gain is high in the direction of the lobes of the antenna's radiation pattern and gain is low in the directions of the pattern's nulls. From around 10 to 15 MHz and lower in frequency, a significant amount of electrical noise is usually received along with the desired signal. In such cases, increased antenna gain seldom improves reception. Above these frequencies, increased antenna gain generally improves reception. For transmitting, increased antenna gain generally improves communication at any frequency.

Note that gain compared to an isotropic antenna is 2.1 dB higher than when compared to a dipole. Failure to consider this difference can lead to inflated claims of antenna gain.

❖ Polarization

The polarization of a wave is determined by the orientation of the electric field of the waves that the antenna launches when transmitting. When receiving, the antenna will respond best to waves with the same polarization as those it would transmit. For VHF and higher frequencies, the polarization of signals received by direct waves changes relatively little. Antennas of most two-way communication occurring in this frequency range are typically vertically polarized, whereas television signals are generally horizontally polarized. On the HF band, signals

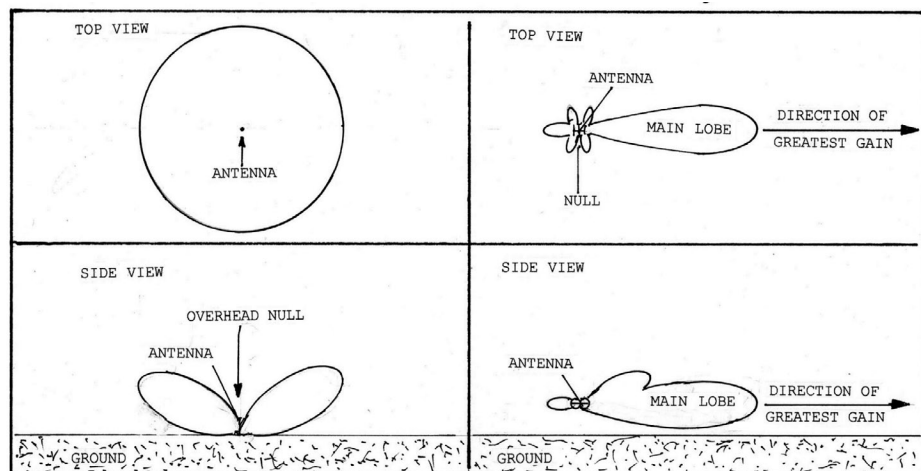


Fig. 1. Horizontal radiation pattern for a vertical Marconi antenna (A). Horizontal radiation pattern for a Yagi-Uda beam antenna (B). Vertical radiation pattern for a vertical Marconi antenna (C), and a vertical radiation pattern for a Yagi-Uda beam antenna (D).

This Month's Interesting Antenna-Related Web site:

A discussion of factors to consider in choosing an antenna:
www.astronwireless.com/antnel.html

Information for improving HT performance, also emergency readiness and operation:
www.scc-ares-races.org/emergency_operations_and_ht.htm

frequently undergo a change in polarization between the transmitting antenna and receiving antenna, so both vertically-polarized and horizontally-polarized antennas are common on this band. At MF and lower frequencies, vertical polarization is pretty much the rule.

❖ Feed-Point Impedance

For maximum performance, the feed point impedance of an antenna must match the impedance of the feed line connecting it to the transmitter or receiver. If the impedances of the line and antenna do not match, then you should include a matching circuit in your antenna system. An exception to this rule is that, for receive-only antennas below 10 to 15 MHz or so, matching is usually relatively unimportant.

❖ Maximum-Power Rating

RF current flowing in an antenna generates heat. And the voltages developed on the antenna are sometimes quite high. So there is a limit for each antenna on how much power it can handle.

If you are going to use your antenna for transmitting, you will want to consider this factor in the antenna you select.

❖ Selecting Your Antenna

Obviously, other criteria such as acceptable maximums in size, cost, and weight must also be considered. Once you have set your criteria for the antenna you need, you can request the information on those criteria from the company that manufactures the antennas you are considering. Build-it-yourself articles often do not give much information on all the variables mentioned above. You can usually get additional information from antenna books such as the ARRL's *Antenna Book*, Carr's *Practical Antenna Handbook*, Bill Orr's series of antenna books, or by searching the internet.

RADIO RIDDLES

Last month:

I asked: "Of what use is the line-of-sight calculator mentioned above? It is often said that communications on VHF, UHF and microwave is limited to line-of-sight distances. But is the distance that we can cover on these bands actually limited to the line-of-sight distance that you could see from the antenna to the distant horizon?"

Although the line of sight is a useful thing to know, we're not limited to that distance for

our VHF-UHF-microwave communication. One reason is that the line-of-sight for radio waves, sometimes called "radio line-of-sight," is somewhat greater than the line-of-sight we have with our eyes. Also, if you communicate with a station beyond the horizon, then the total distance to consider is the sum of the line-of-sight paths for the two stations. In addition, there is something called "knife-edge diffraction" in which radio waves passing over a horizon which is a hill top or ridge are bent such that the waves can be received beyond that horizon.

This Month:

What is an "antennascope"? (A) A magnifying glass for inspecting antennas. (B) A telescope used to view high, out of reach antennas. (C) A whip antenna whose sections fit together like sections of a telescope. (D) None of the above.

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

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More Radio Data Books for Your Library

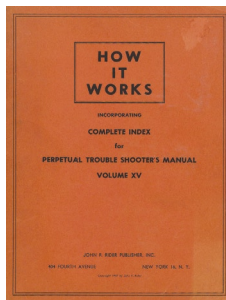
Welcome to the January column! The hip surgery I mentioned last month was completed and I'm home recuperating. Things are going well, but I'm still unable to continue the bench work on our Trans-Oceanic project. And so I'm going on with the radio data book theme I began in the last column – which featured *Rider's Manuals*. In past issues I've suggested books that I've found helpful on radio repair but, prior to last month, haven't done much in the way of suggesting data sources.

Actually, collecting vintage radio data books can be as rewarding as collecting vintage radio hardware. It does require a lot of bending and kneeling, though, because much of the treasure will be found by sorting through disorganized boxes found under the flea market tables. Here are some of the kinds of items to keep your eyes peeled for:

❖ Rider's "How it Works" Manuals

I have in my library several books titled "How it Works," and intended as supplements to specific *Rider's Manual* volumes. They're 8-1/2" x 11", soft cover, and vary greatly in page count. The ones I have go with Rider's volumes 8, 9, 15 and 16. A couple of them include a complete index for the volume in question; a couple of them are subtitled as a special section of the volume. However, they are all individually bound and not punched for insertion in the Rider's binders. Incidentally, you may also find similarly bound booklets containing *only* an index for a specific volume or group of volumes.

These publications are intended to present and discuss new circuit features that appeared in the receivers covered by their accompanying volumes. For instance, the Volume 8 "How it Works" includes discussions of variable selectivity i.f. circuits and beam power tubes. Coverage in the one for Volume 9 includes Philco Mystery Controls and shadow-type tuning indicators. From time to time, more general kinds of information seem to be included. Both of the booklets just mentioned include very thorough and detailed instructions on how to align superheterodynes.



❖ Promotional Data Books

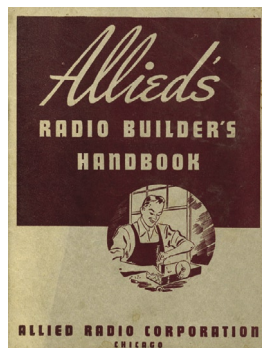
Published by radio manufacturing firms, these books offer useful technical data in a format that encourages purchase of the company's products. One of the best examples is *The P.R. Mallory Radio Service Encyclopedia* mentioned in last month's column. It provides a very complete alphabetical listing of all radio receivers produced up to its release date.

Useful technical information is provided for each set, including tube lineup, i.f. peak and Rider's reference. A recommendation is provided for the correct replacement Mallory controls, capacitors and/or vibrator to be used with each one. My voluminous 1948 6th edition is 8-1/2" X 10-3/8", soft cover, and contains 552 pages. I also have a 1939 third edition (8-1/2" X 11" soft cover) whose 264 pages obviously contain fewer radio listings.

A publication oriented more to radio hobbyists than radio servicemen is the *Allied Circuit Handbook*. Published by Allied Radio, Corp, Chicago, my 1961 6th Edition (8-1/2" X 11", soft cover, 36 pages) contains quite a lot of useful technical information designed to help beginners get started in the hobby. This information can be just as useful to vintage radio enthusiasts today, but the most interesting feature of the book is the compilation of circuit diagrams and descriptions for the company's complete line of Knight Kits.

The 6th edition contains data on fourteen kits, including the 2-band transistorized "DX-ER," AC-DC "Space Spanner," and AC-DC "Ranger" receivers. This information would obviously be very useful to you if you were to come upon one of these gems at a flea market and decide to take it home and make it work again.

Also in my collection is a representative of an earlier Allied informational series: *Allied's Radio Builder's Handbook*, Eleventh Edition, 1943. Also 8-1/2" X 11" soft cover with 36 pages, it follows the same format of providing useful technical information followed by schematics and descriptions of the available kits. (There's much more technical



information in this edition, but data for just 6 kits, reflecting the smaller product line available at the time).

A publication similar in concept, the *Meissner "How to Build" Instruction Manual* was offered by another kit manufacturer: The Meissner Manufacturing Division of Maguire Industries, Mount Carmel, Illinois. During the 1940s and 1950s, in addition to its well-known coil products, Meissner offered a wide variety of kits for the advanced hobbyist.

Like the Allied book, the Meissner offering includes selected technical topics as well as data on the complete line of kits. Actually, the complete, detailed construction and operating manual for each kit is provided, including all parts lists, schematics, pictorial diagrams, etc.

If you come across one of these books at a flea market, pick it up even if you don't yet have a Meissner kit on your possession. You never know when one will land in your lap – and if it does you'll be prepared! In the meantime, browse through and enjoy the many interesting examples of 1940s circuit design.

My 160-page 1949 edition is 8-1/2" X 11" soft cover. It includes information on almost 30 kits, including the famous Meissner Signal Shifter (a vfo [variable frequency oscillator] for ham use), all manner of high-performance receivers, the Meissner "Analyst" (a diagnostic tool patterned after the well-known RCA/Rider "Chanalyst,") and much more.

❖ Prepackaged Diagnoses

Could you use a reference book that provided advice such as this given for a Majestic 130A?

... Considerable profanity was spent to no advantage on a set completely dead, even to local stations, even though all voltages and condensers were perfect. Tubes all ok, everything ok, except the set would not play. Trouble finally located in a shorted 0.002-ufd condenser connected in series with a 100,000 ohm resistor from detector plate to cathode. .

A modern antique radio restorer of some sophistication might smile at this kind of help, feeling that such a problem could be solved quickly using normal troubleshooting skills. But there's no doubt that a great deal of diagnostic time could be saved should a problem turn up that matched one of the examples in a book. This is especially true with earlier sets,

which were not as uniform – electronically or mechanically – as those manufactured, say, from the late 1930s on. Odd mechanical arrangements and trick circuits abounded.

The bit of troubleshooting advice quoted above is from *Radio Service Trade Kinks* by Lewis S. Simon, McGraw Hill Book Company, 1939. 7-1/2" X 9 3/4", hard cover, 269 pages. Simon was manager of a chain of radio stores and of a turn of mind inclined to record and categorize the problems encountered and solved by him and his assistants.

I'm not sure that I've ever actually used one of these diagnoses to fix a radio, but I've often thumbed through the volume to enjoy the problems and solutions and the sometimes salty language used to describe them.

A much more comprehensive book of this kind, and one I'd recommend for the library of any serious radio restorer is *Radio Troubleshooter's Handbook* by prolific and respected radio service writer Alfred A. Ghirardi. It's billed as a companion book to the author's monumental *Modern Radio Servicing*. However, the books have little in common – the latter presenting a systematic and logical approach to finding trouble in radio receivers.

My copy of the *Handbook* is the "Third Revised, Enlarged Edition" of 1943. Published by Murray Hill Books of New York, NY, the 8-1/4" x 10-3/4" volume has a hard cover and contains 743 pages. Noting that the book was published in the midst of World War II when civilian radio production was non-existent, the author's preface expressed the hope that service personnel would find it useful in repairing older radios that, in peacetime, would probably be relegated to the trash heap.

The first 400-odd pages are devoted to "case histories of common trouble symptoms and remedies for 4,820 models of 202 makes of home and auto-radio receivers and record changers." The final 300-plus pages are a gold mine of valuable technical data too diverse to describe here. The problems and remedies – as necessitated by their sheer volume – are written in a condensed style quite different from the casual prose of the Simon book.

❖ Tube Manuals

No discussion of radio data books would be complete without mentioning tube manuals. A tube manual is obviously a "must have" for the library of any vintage radio enthusiast – beginner or expert. Without the basing diagrams and voltage requirements it provides, you are either relying on your memory or flying blind during your troubleshooting efforts.

A great variety of tube manuals have been published, mostly by various tube manufacturers, over the years. Almost any of these will give you the information you need – but there is just one caveat. If you are mostly into pre-World-War-II radios, try to avoid the manuals published after the 1940s.

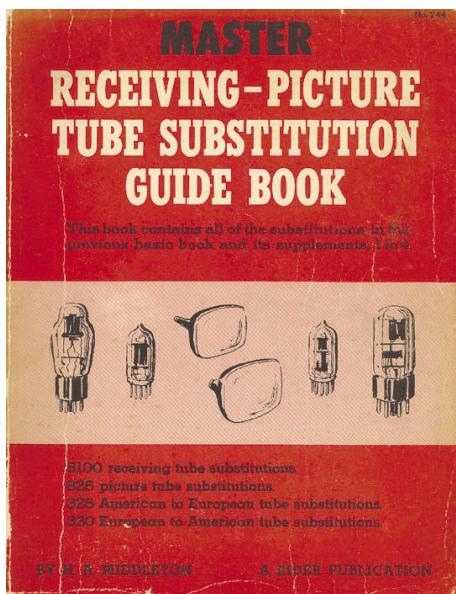
Vacuum tube technology was then advancing so explosively that new tube types were crowding older ones off the mainstream pages. Try to look up a 26 or a 71-A and you may be referred to a "Chart of Little-Used Tubes" at the back of the book. There you will probably

find a single line of meager information and a reference to a base diagram located elsewhere in the book. Of course if your interests also encompass postwar radios, you'll want to acquire a later manual as well.

I like the digest-sized (8-1/2" X 5-1/4"), soft cover, *RCA Receiving Tube Manuals*. Their small size and clear typography makes them very convenient to use. The earliest one I happen to have (Technical Series RC-14, 256 pages) has a 1942 date code. While the tubes from the 1920s and 1930s may not be given the space allotted to the later ones, they each have their own individual entries in the proper numerical spots, along with a base diagram and adequate information, including typical voltages. This is also true of my 1950-vintage RC-16.



Another good tube reference to have in your library is a tube substitution manual. The most complete one in my own collection is the *Master receiving-Picture Tube Substitution Guide Book* by H.A. Middleton. (John F. Rider publisher, 8-1/2" X 11", soft cover, 343 pages). The book was published in 1959 – a time when, as noted in the preface, "... the never-ending stream of new tube types continues at an accelerated rate."



At that time, even relatively recent tubes were becoming obsolete and either impossible to get or in very short supply. The *Guide Book* offers possible substitutions not only for recently obsolete tubes, but for the earliest types going back to the dawn of broadcast radio.

The substitution information is divided into five sections: Receiving Tube Substitutions, Emergency Tube Substitutions, Rugedized Tube Substitutions, Foreign Tube

Substitutions (both European to American and American to European), and Cathode Ray Tube Substitutions. One simply looks up the tube to be substituted for by number and the possible substitutions are listed beneath it.

Except for the emergency tube substitutions, each listed substitution is classified as either Good ("G") or excellent ("E"). Rewiring information, if needed, is given as are any other circuit constraints. The emergency substitutions, to be used only as a last resort, are all noted as poor performers.

The remaining five sections include much useful information, such as a receiving tube manual, servicing suggestions, and a cross-reference between military "VT" numbers and commercial tube numbers.

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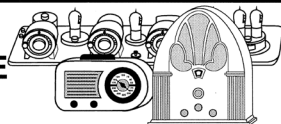
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Back-Up Power for Home and Radio Hobby

By Gregory Smith WB2PPQ

Back-up power has become of considerable interest to homeowners as utility power outages have become more frequent. Power demand has increased considerably over the last few decades in both homes and businesses. Utility companies have not been able to keep pace with this demand. Also, aging utility transformers and high voltage cables are decades old, which according to testimony and news accounts was at the root of the 10-day blackout in Queens, New York, in 2006. The supporting infrastructure is just not there to support high demand periods.

This situation coupled with bad weather events has created havoc for the homeowner in inconvenience and, most importantly, with property damage. With the advent of affordable backup power, 24 hour power protection can prevent flooding basements, loss of lighting, heating and air conditioning, and the loss of power to other appliances, including radio communications equipment.

The intent of this article is to give the reader a thorough overview and understanding of residential back-up power, including environmental and safety issues. These are covered in Article 702 – Optional Standby Systems of the (NEC) National Electric Code. This article will only describe “Backup Power” that will typically run heating, refrigeration, lights and hobby equipment. This system differs greatly from “Emergency” or legally required standby systems which are critical for life, safety and hazard prevention.

❖ Which System is for You?

Before a backup power system is bought, the homeowner needs to decide on the type of system he would like to install – automatic or manual? The automatic system will provide the home with power automatically in the event of utility failure. The second system, in contrast, will require the homeowner to initiate the back-up generator system.

❖ Automatic Transfer System (ATS)

This is the top of the line system that will sense the utility outage and start the generator and switch the residence power load to back-up power. This system consists of an automatic transfer switch, power distribution sub panel (standby power), generator, system control panel, and fuel source.

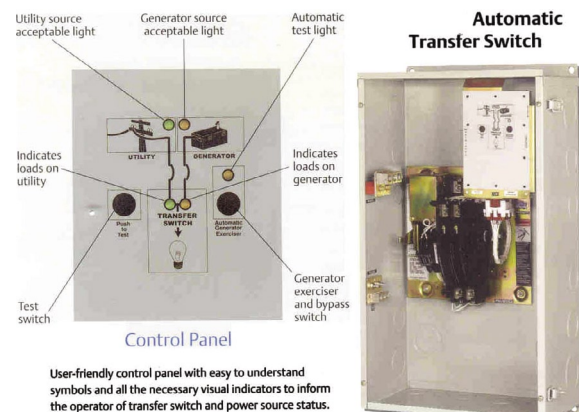
A critical component of this system is the transfer switch. The transfer switch for most automatic applications will be rated between 100-200 amps. A home with a 200 amp service that utilizes a 200 amp rated ATS will require a generator large enough to power the load of the entire residence. If the generator capacity is rated less than the service, a sub panel breaker box (standby power) must be used. The sub panel will contain all the standby circuit loads that you desire to operate during a utility power outage. These loads might include: lighting, well pump, sump pump, freezer, water heater, air conditioning, security system, and any other loads.

Automatic back-up systems in most installations incorporate an engine exerciser that runs the engine generator set with standby loads on a weekly or bi-weekly schedule. This exercise verifies the reliability of the system and improves the operation of the generator.

The Transfer Switch is a two pole, break-before-make switch that isolates the utility source from the generator source. This isolation feature prevents the generator from back feeding into the utility power system. A good transfer switch will have design characteristics to minimize contact arcing and permit several thousand switch operations. Engine start contacts are also incorporated as part of the ATS assembly to provide automatic starting of the generator's starting circuit. The ATS should meet UL Standard 1008 and have a label that indicates that specific approval. The ATS should also have a label that specifies either “Automatic” or “Non-automatic” operation. UL (Underwriters Laboratory) is a third party laboratory that inspects a product under specific standards for safety.

An automatic back-up system operates in the following manner. Upon utility failure, the ATS Controller senses the outage and waits about 3 seconds to respond. This wait period prevents false generator starts due to short voltage disturbances. After the 3 second delay, the generator starts while the Controller continuously monitors the generator's output voltage. Upon reaching acceptable output voltage, the Transfer Switch transfers the electrical loads onto the generator.

When the Control Panel senses that the utility power has returned, it waits at least 5



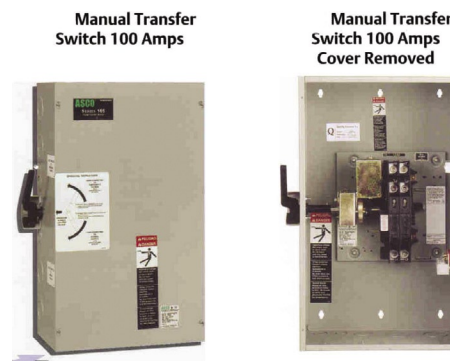
minutes to switch the loads back to utility. Then, the generator will run for a period of time to provide a cool down period.

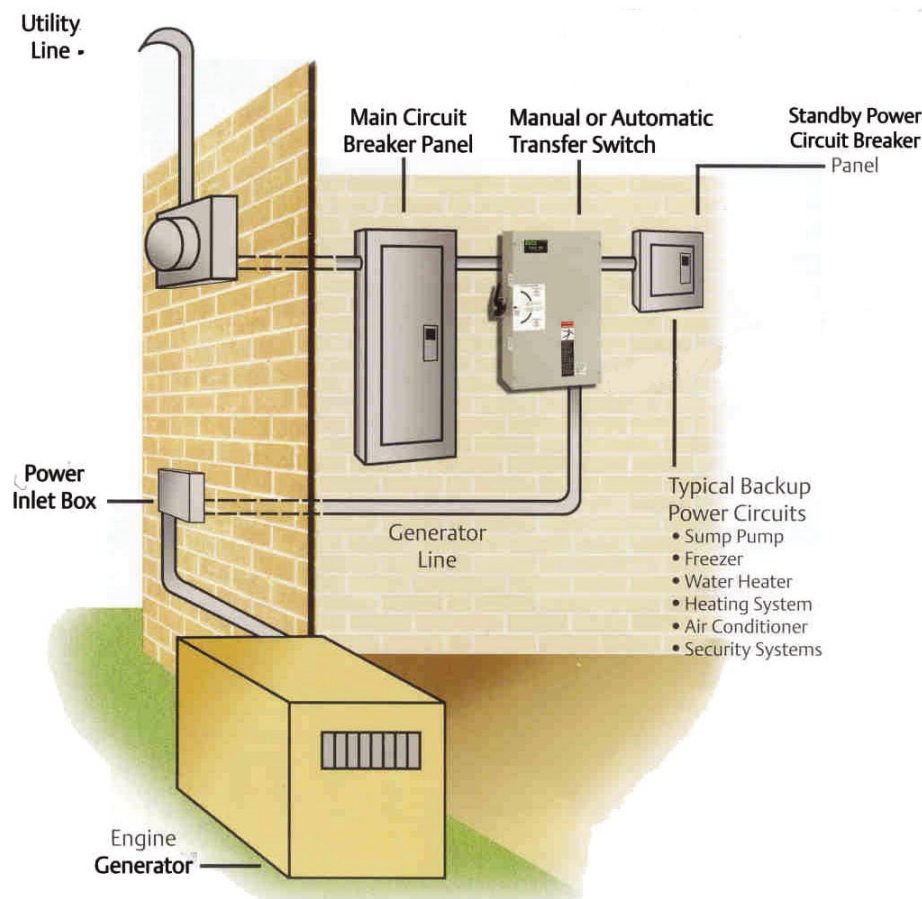
Most systems will have a run timer to provide the user with the total time that the generator has been in operation. This provides a convenient tool for periodic maintenance.

Fuel choice for residential systems in most cases is either propane or natural gas for convenience, reliability, and extended run time capability. Diesel fuel is often not chosen because of the special permit requirements and installation codes that must be met. Also, diesel exhaust may require expensive emission controls. Environmental clean-up costs in the event of an accidental fuel spill will be costly.

❖ Manual Transfer System

This system requires a generator with manual start, fuel source, (MTS) manual transfer switch, and sub panel (standby power) dedicated to the standby loads. These loads would typically be; lighting, sump pump, freezer, water heater, heating system, air conditioning system, secu-





city system, and other equipment. Upon utility failure, the user will need to start the generator. After the generator has warmed up, the homeowner will then position the manual transfer switch to the generator source. The manual transfer switch quickly breaks connection on the utility then quickly makes contact with the generator.

MTS switching speed is critical to reduce arcing; UL 1008 requires that the MTS will have an operator that quickly transfers the switch regardless of how slow the user actuates the transfer. The MTS is designed with an interlock prohibiting the connection of both power sources.

This MTS should carry a UL 1008 listing and be labeled for non-automatic operation. Padlock capability is another important feature that will prevent unauthorized operation. This feature is important if the installation has open access.

❖ Portable Generator / Power Extension Cord

The portable generator consists of an internal combustion engine, generator, fuel tank, and generator control panel. These components are mounted on a frame utilizing some vibration dampening. Manufacturers offer models that have pull starters along with more expensive models that are electrically started from a storage battery.

Generators of this type run on gasoline, diesel fuel, propane or natural gas. Some manufacturers have a unique design permitting operation using either of two or even three different

types of fuel. Gas and diesel units integrate the fuel tank with the generator. Run times generally vary between 5 and 10 hours depending on the engine consumption, size fuel tank and generator load.

The most common fuel is gasoline; however, it is very flammable and must remain fresh. An additive may be placed in with the fuel to provide greater storage time.

Diesel fuel is a safer fuel because it is less flammable and offers greater efficiency in generator run time. However, it also requires an additive for extended storage and emits a strong odor during operation.

Propane and natural gas provide the greatest equipment reliability and the cleanest burning. Some generator manufacturers offer tri-fuel engines that can be selected to operate on propane, natural gas or gasoline. Propane operation is more costly since the storage tank will need to be bought or rented.

If the equipment is to be used in the State of California, the power generator needs to meet the required emissions standards.

The Power Extension Cord needs to be UL



and National Electric Code approved. This will ensure that the cable is designed for outside use and meet safety requirements. The appropriate cord set will have a weather proof plug and terminate with multi-outlets. Generator manufacturers sell this cable as an accessory and it is a wise decision to consider this purchase. This system requires the user to run the extension cord, start the generator outdoors and connect individual loads after the generator warms up.

❖ CAUTION!

All the systems mentioned above must follow stringent safety rules and meet local municipal ordinances regarding installation, engine exhaust venting, grounding, and noise requirements. Extreme care must be given to guarantee that the generator's exhaust does not enter the residence. Carbon monoxide is a lethal gas that is colorless and odorless. This gas is produced as a product of combustion from the generator's internal combustion engine. Proper grounding is also required to prevent an electrical shock hazard.

All permanent installations require a municipal electrical construction permit before installation. A licensed electrical contractor must be hired for the project and the work done by a licensed electrician. All equipment including the transfer switch needs to be installed in accordance to local electrical codes and National Electrical Standards. Upon completion, all work needs to be inspected and approved by the local municipal electrical inspector. A good reference is the National Electrical Code NEC/NFPA 70, 2005, Article 220. Copper wiring should be #8 to 3/0 AWG for 100 and 200 amp installations.

Generator grounding needs to comply with NEC Article 702, section 702.10 Portable Generator Grounding. This cable needs to be able to endure constant vibration without work hardening and breaking, causing the ground circuit to electrically open. A braided cable works well here. This provides electrical safety for the user and added protection in the event of a lightning strike at the generator. This practice should be followed with a portable generator as well.

❖ Environmental requirements

The homeowner needs to review if the municipality has a noise ordinance and, if so, the restrictions set forth in that ordinance. Some communities have a window of time when power equipment may be operated, which will restrict when you may generate backup power. Portable power generators create a noise source averaging around 75dB(A); diesel generators in most cases will exceed this value. Automatic systems incorporate sound dampening material to deaden noise. Typically, this brings the noise level in the order of 70dB(A) at 23 feet distance.

❖ Generator system reliability

It is highly recommended that the homeowner do some consumer research regarding the reliability of various manufacturers' engine generators. Most power generator service

continued on page 71

MT REVIEW

The Tecsun Green-138 Lights Out for the Poor Man?

By Eric Bryan

At first glance, you might think this radio is a multi-band portable from the late 1960s or 1970s that you would have carried to the park or beach. But turn it around, and the generator crank and LED light will tell you the Tecsun GREEN-138 falls into the Emergency Radio category.

My first adventure into the land of windup radios was a purchase of the Grundig FR200. This set had tuning backlash and a temperamental band selector (a slight touch would detune the unit).

Then I found Steve Waldee's fascinating "A Not-Mini Review of Grundig's MINI 100 Radio" online. Here he described his similar experience with the FR200. That sent me back to the store to trade the FR200 for the 100PE. That was it for windup radios for the moment.

Then Tecsun sent me a catalog from Hong Kong which showed the GR-138. Soon the mailman was knocking at my door with an overseas package. It being a windup radio wasn't my only reason for buying. On top of that feature I wanted a solid knockabout SW radio with strong audio and stable reception.

❖ Coverage

The GR-138 includes FM, MW and SW. Coverage is 87-108 MHz, 525-1610 kHz, 3.2-9 MHz and 9-22 MHz. There is some overlap at the tops and bottoms of each band.

Oddly enough, though the thick tuning needle indicates FM and MW frequencies, it doesn't extend down to the SW scale. You must draw an imaginary line down with your eye for SW tuning. A 0-10 scale helps somewhat.

The irony here is that the GR-138's SW calibration is pretty good, the best I've seen on a Tecsun analog radio. The 90 through 13 meter bands are shown on the frequency scale to assist in SW tuning.

When the unit is on, the tuning needle glows, but not the frequency scale. In darkness this gives you a rough idea of dial position. There is no option to turn this light off.

❖ Controls

All is simplicity here: An on/off volume dial, a great big tuning dial, and a smaller fine tune dial. All work in the traditional ways.

On the back is the band selector slider. It's tight and not overly sensitive. Merely touching it won't send you tumbling off frequency like

with the FR200.

Another slider on the back turns on the emergency light for a steady shine or strobe. The LED is set in a reflector and casts a bright, warm glow, similar in color to firelight. The earphone mini-plug is on the back, too.

More on the controls under "Power" and "Selectivity."

❖ Power

All right, to get the simple part out of the way, you can simply open the rear battery cover and insert two AA cells. Now find the switch above the cover, slide it to "AA battery" and you're set to go.

The next method is to use the included 220 V AC adaptor and 110/220 V transformer. Plug the adaptor into the 5V DC jack, and a red LED glows to show you the internal Ni-MH battery pack is being charged.

But this isn't an AC adaptor to run the radio, only to power the charger. You are not to run the radio or light from the battery pack while charging, or risk damage to the adaptor and lamp, the manual says. (Presumably it would be fine to operate the radio from two AA cells while charging the battery pack [the switch selected



to "AA battery"]).

To further complicate matters, there is no automatic charger shutoff nor does the LED blink when the battery pack is fully charged. Furthermore, you are warned to not exceed the eight hour charge time. Doing so could damage the battery pack, the manual states.

The only way to safely charge the battery pack via the AC adaptor is to run the pack flat, plug in the adaptor, and keep track of time. After eight hours, unplug the adaptor, flip the switch to "Recharge battery" and the radio will operate off the Ni-MH pack.

The good news is that, running the radio intermittently but regularly at a "personal" volume level over the speaker, one charge lasts four to five days. Lessen this for listening at "room"

Specifications

Sensitivity
FM < 10 μ v
MW < 1 mV/m
SW < 50 μ v

Output
> 125 mW

Power
Two AA cells 3 V
Ni-MH battery pack 3.6 V, 650 mA
AC adaptor for charger 5 V, 50 mA, center negative

Speaker
2.5 inch

Earphone
8-32 ohm

Dimensions
Approx 8 x 4.75 x 2.35 inches



volume, and increase it if using earphones.

Lastly, for power outages, you can extend the generator crank and turn it at two cranks a second for 30-60 seconds. The manual says 120 turns in one minute powers the radio for a paltry 15 minutes.

I've found that 60 rotations in 30 seconds gives about 20 minutes of SW or MW play at personal volume level before the sound starts to fade. FM lasts 20-25 minutes.

With the radio off, this 30 second charge runs the light for about 10 minutes before it starts to dim. By 15 minutes it's quite weak.

❖ Sensitivity

The BBC on 5975 and the Voice of Russia on 15595 came in at my Washington state location with stunning, perfect reception over the telescopic antenna. Other strong signals from Radio Netherlands, Radio Japan, Radio Korea International etc. were also outstanding.

Receiving over the whip, strong SW signals stay strong after setting down the GR-138. This is a must for a kitchen, shop, bathroom, or deck radio.

Like with the Kaito WRX911, the AGC is such that when first tuning in one of these powerful transmissions the signal is "squashed" for a second before it comes back up.

Clipping a short wire (under 13 feet) to the telescopic antenna gave an ideal boost to SW which helped me to log the stations in Table One.

Table One: Logged Stations (kHz)

Belgium (via Germany) ...	17570
Bulgaria	9700 11700
Canada (CHU)	7335 14670
Croatia (via Germany) ...	9925
Cyprus (BBC)	7265
France	7280
Gabon	5475
Germany	15205
Greece	9420 12105
Israel	15640
Italy	11800 15380
Kuwait	11675 15495 15505
Mexico	6185
Morocco	15345
Portugal (DW)	7170
Saudi Arabia	17560
Serbia-Montenegro	9580
South Africa	7390 9685
Sri Lanka (DW)	17820
Tunisia	7275
Turkey	9460
Vatican	7250

For an external SW antenna, the Chinese manual recommends a plastic-coated wire of 3-4 meters. Connection is made by wrapping the insulated wire around the whip for 5-10 turns without making a metal-to-metal connection (loose coupling). With loose coupling, reception was still solid with excellent signals on 9685 Channel Africa and 11800 RAI Italy. The Voice of Croatia on 9925 sounded almost as spectacular as the BBC and Voice of Russia.

On MW this set has no trouble picking out a distant, weak daytime 1300 signal from a local 1330 station. At night, with decent conditions, the band is teeming with transmissions from

Canada and neighboring states. MW reception is via the internal ferrite bar, but on some signals attaching the wire to the whip gives a significant RF boost.

Turning to FM, I checked for a 90.3 signal from a college station 30 miles away. All I could find was a jumble of sounds, including spurious signals from strong transmissions further up the band.

The telescopic antenna being non-swiveling, I turned and dipped the GR-138 to try to improve reception. It was still a mess. With disgust I collapsed the antenna and was about to turn the unit off when suddenly a clear signal leaped to the fore.

I tuned around again for the 90.3 station. Finding a somewhat scratchy signal, I waited for an ID. I was surprised when it turned out to be a different college station, one which I hadn't noticed on any other radio, from 45 miles away.

Disoriented, I tried again for 90.3. Then I realized that the signal that had come to life when I first folded up the antenna was 90.3, nice and clear.

Leaving the telescopic antenna down and bandscanning, most all the stations now came in well. Some required partial extension of the antenna. (The manual recommends altering the length and position of the whip for FM and SW reception.) Setting the radio at different angles sometimes helped.

Bottom line: The GR-138 is a "live wire" on FM, maybe hypersensitive.

❖ Selectivity

All is fine on FM and MW. But a lot of coverage has been packed into SW1 and SW2. Using the main tuning dial here takes the patience of a SW veteran. The fine tune dial is needed for precise adjustments. But the fine tuning isn't very fine. On SW1, it has a 40-50 kHz spread. On SW2 it covers 130 kHz (e.g., 15-15.130 MHz)!

Despite this, the GR-138 can pick out signals spaced 5 kHz apart when they're of comparable strength. I'm able to separate Serbia-Montenegro on 9580 from VOA on 9575 when the latter isn't too strong. But transmissions with very strong neighboring signals are a different story. A massive 5755 transmission made a medium-strength one on 5765 unusable.

There are no spurious signals on MW from 49 meters on this single conversion radio. But with the wire clipped on, Radio Thailand's giant 5890 relay transmission was audible in the background up 49 meters. With loose coupling, Radio Thailand's 49 meter spurious signals faded away.

The GR-138's LO oscillates at the radio's IF of 455 kHz above tuned SW frequencies. Images of strong SW transmissions are cast 910 kHz below the real signals, so most of them fall outside SW broadcast bands. One main exception is a 5945 ghost from a 6855 transmission. (Of course, 60 meters falls prey to some 49 meter images.)

❖ Drift

Drift on SW is mild and not nearly as troublesome as it is on smaller analog sets. Some

periodic readjustment is necessary, but you don't have to constantly play a game of catch-up following a signal around.

Very strong transmissions can go for a long time without a need to tweak the dial.

❖ Audio

The GR-138's 2.5 inch speaker, assisted by the radio's deep cabinet, has considerable resonance and boom. The strong BBC, VOR etc. broadcasts came in with rich, crystal clarity.

But the most striking sounds came from Ecuador - HCJB's ethnic music program on 9745 kHz (*now, alas, a thing of the past-ed.*). Here the Latin percussion snapped out in sharp, crisp spikes from the full, mellifluous whole of the rest of the instruments.

Another memorable audio experience was listening to Radio Exterior de España's "Musica de Contemplacion" on 15110 while relaxing one afternoon. The Moorish sounds were clear and haunting over the GR-138's speaker, the aural-painting creating a meditative experience.

The speaker has enough oomph to fill a room and to compete with noises in the kitchen or shop. Though I have PLL-tuned SW radios, I find I'm using the GR-138 more than them for casual listening because of its room-filling sound.

Audio is also excellent with a good pair of earphones, though FM is in mono.

❖ Overall

I'm much happier with the GR-138 than I was with the FR200. It's a solid block of a radio, with fairly sturdy and stable controls.

A main drawback is the AC adaptor/charger issues. Not being able to leave the radio on the charger so that it's ready when the lights go out makes this feature of limited emergency-preparedness use. Also the non-swivel antenna is sometimes inconvenient for FM reception.

The chief advantage of the GR-138 over the FR200 is its absence of SW tuning slop and backlash (assisted by using a strip-and-gear, instead of a cord-and-pulley, dial and needle system). But with the GR-138 you do to some extent trade those problems for even more compressed SW bands coupled with not very fine "fine" tuning.

Still, I found the GR-138 more pleasurable and easier to tune on SW than the FR200. The SW tuning can be mastered with regular use. Mainly you tune to one of the meter bands marked on the scale, then gently and slowly hunt for signals (like in the old days).

The GR-138 looks to have the same generator crank mechanism as the FR200, about which some have complained of crank breakages.

Like the good worldband portables of the '60s and '70s, when ionospheric conditions are agreeable, the GR-138 feels "alive" in your hands when tuning around. It receives well.

I bought my GR-138 on eBay from seller Liypn (<http://stores.ebay.com/V-COM-COLLECTIONS>) for \$24.90 plus \$20 shipping (7-10 days to the US). Thank you to Liypn for translating into English the Chinese materials about the GR-138. The radio is still sold on eBay for \$29.90 more than a year later.

A New Game in Town: DXing Broadcast Harmonics

By Dave Beauvais KB1F

I'm pleased to call your attention to a whole new variety of "illegal" signals to DX, log and verify! Not strictly speaking "clandestine" stations, (and "illegal" only by technical accident), there is nonetheless an absolutely THRIVING market in long-distance SECOND HARMONIC signals of regular broadcast stations, especially in the band 2400 to 3000 kHz. They make for most interesting listening.

During the week December 25 to January 1 ('82-'83), no less than eight broadcast stations were logged on their second harmonics in this band. From our listening post in Massachusetts, stations as far south as Virginia, and as far west as Ontario were heard at good strength; and in most cases positive identifications were tape recorded and sent on to the stations for verification purposes. A ninth station was logged on its fourth harmonic!!

In no case was any of these stations audible on its fundamental frequency at the time harmonic reception was noted. This rules out any possibility of receiver imaging as the cause of the reception. It also makes them unique loggings for the clandestine, pirate and "bootleg" specialist!

And now a few particulars about time and place to DX these spurious harmonics. Propagation is best from an hour before, to an hour after, sunrise at the transmitter, which remains in the (favorable) path of darkness as the sun is rising at the receiver location.

Evening hours also offer some possibilities for logging broadcast harmonics. There is, however, greater competition (QRM) from utilities and navigation beacons at these hours. And there is another factor to consider: most of these stations logged on their harmonics are lowpower, daylight-only broadcasters, who sign off at sunset. Stronger, clear-channel stations are almost never noted on their harmonics.

There seems to be a reason why the "daylighters" are prone to spurious emissions. Since their signals are not on the air during most of the hours at which ionospheric propagation occurs, their harmonics (under daylight conditions) probably die out within a few miles of the transmitter site. As a result, no one has ever complained about the interference, and the transmitters in question have never been "buttoned down."

Only during those two or three hours at which a partial path of darkness remains

between transmitter and receiver sites, will those harmonics propagate ionospherically for hundreds or even thousands of miles.

It's a bizarre phenomenon but it's your golden chance for some very challenging games of DX skill!

A few mandatory requirements for the game are: 1) A good communications receiver covering 1.7 to 3.2 MHz. (We use an R-390-A and an HQ-145A)! 2) A long-wire antenna, preferably 150 or more feet in length (those harmonics are very weak, and your receiver will need all the help it can get); 3) A relatively quiet location (free of power line noise and appliance "hash"); 4) A comprehensive directory of U.S. broadcast stations, crossreferenced by call letters, frequency and transmitter location (White's Radio Log or equivalent); 5) Patience, patience, patience!

A further observation we've made is that stations in the 1200 to 1400 kHz range seem to be most prone to harmonic propagation. Seven of our eight loggings were of stations operating in that frequency range. A possible factor here may be the fact that a reasonable-sized broadcast tower (150-200 ft.) becomes an almost perfectly resonant half-wave antenna at 2.5 MHz (while it presumably operates as something closer to a quarterwave at its fundamental frequency). Any harmonic energy reaching the tower has a good chance of getting radiated!

Table 1 is a list of the stations we've

logged in the first week of searching. Try your hand at these – and keep probing for new entries! Don't forget to write to each station informing them of your reception. Enclose a (cheap) cassette of the harmonic signal to spur their interest, and enhance your own credibility!

Keep your ears on!

DXing Broadcast Harmonics: The New Game Updated

By Dave Beauvais, KB1F

Since publication of "DXing Broadcast Harmonics" (MT, March 1983) there have been a few interesting developments: a listing correction, a new "catch" (the furthest yet), and a new station you will encounter in the region

TABLE 1

FREQ	FUNDAMENTAL	CALL	LOCATION AND REMARKS
2480	1240	WCOU	Lewiston, Maine. 1000 watts. City I.D. positive, local commercials.
2500	1250	CHWO	Oakville, Ontario. 10,000 watts. Zero-beat with WWV! FCC will have a bird if they ever hear this. Station confirmed by letter, is taking "corrective action."
2560	1280	WBRX	Berwick, Pennsylvania. 1000 watts. Bombs in like a local! One of the strongest signals on the band.
2580	1290	WQIN	Lykins, Pennsylvania. Listed at 500 watts. Very strong, positive I.D.
2660	1330	WASA	Havre de Grace, Maryland. 5000 watts. Positive callsign-D.J. repeated it slowly, one letter at a time. Does this guy know something?
2800	1400	WXAM	Charlottesville, Virginia. 1000 watts. Local news. commercials. positive city I.D.
2820	1410	WDOV	Dover, Delaware. Listed at 5000 watts. QSB, weak signals, I.D. by jingle but not much else.
3100	1550	WXVA	Charleston, West Virginia. City I.D. positive. Listed 5000 watts.
4920	1230	WBME	Belfast, Maine, on their FOURTH harmonic! Nothing on the second or third harmonic, but they bomb out on this frequency. Belfast is the home of an FCC monitoring station too! Nothing like living dangerously...

of 1622 kHz – which sounds like a pirate, but isn't.

Taking them in order:

❖ The Correction:

Bob Reinhardt, KA3JYR, program director at WDOV in Dover, Delaware, reports that WDOV does not use the logo or jingle recorded on tape, with a call sign ID believed to be "WDOV." Neither the writer nor MT's editor has been able to make a better "reading," of the recorded call sign, so this station remains a mystery. WDOV assures us that their second harmonic is -86 db at standard reference points. Our apologies to WDOV for the confusion.

❖ The Catch:

On 1900 kHz, from a fundamental of 950 kHz, we noted WYWY, Barbourville, Kentucky, in early February at approximately 6:30 a.m., with good signals and positive I.D. Doug Hammons, K40ZI, engineer at WYWY, confirms our report and comments on the phenomenon: "...I have also heard the second harmonics in the 160 meter band and above, but I am also aware of the propagation that can be obtained on this band using a half wave vertical antenna, 120 full length radials and a few milliwatts of power. This is the situation at most broadcast stations.... (M)y second harmonic is within limits. Notice, I did not say it wasn't radiating energy, just that it was within FCC limits. Thanks for the letter... and good DX or whatever!"

❖ The "Pirate" That Isn't:

Medium-wave DXers in late January had their attention grabbed by a strong signal operating intermittently on 1622 kHz, carrying the audio feed from the Satellite News Channel (a cable news operation), sometimes mixed with what seemed to be a technician's instructions. It was thought to be the transmitter test of a domestic pirate – but DXer Vince Pinto, writing in the March issue of the ACE (*Association of Clandestine Enthusiasts*) Newsletter, traces the signal to a new FCC allocation in the 1600-1650 subband. The transmitter is located in Washington, D.C., and is used by Group W's Satellite News Channel production staff to bring the on-air signal to their news vans operating in the Washington area. The transmitter, Pinto reports, is running 100 watts into a 5-foot loaded whip atop a Washington building. The signal has been heard as far north as Massachusetts (at our listening post) and in several Southern states as well – so SNC appears to be blanketing the East Coast with their "private line" feeds, taking place on the prime pirate channel of 1622 kHz! Reception reports may be sent to: Engineer in Charge, Remote Field News Broadcasts, Group W Satellite News Channel, 1111 18th St. NW, Washington, DC 20008.

Kudos to Vince for a super sleuthing job on tracking this signal – and more evidence of the extreme sensitivity of these frequencies to long-distance propagation at minuscule levels of transmitter power, given optimum ionospheric conditions.

On the Bench continued from page 67

companies will be glad to provide this valuable information. Some manufacturers have designed and engineered generators that are robust and reliable, while other manufacturers are plagued with frequent problems. Another generator specification – surge watts – will be a clue as to the design of the generator and the engine horsepower.

❖ Understanding power terms

Power output wattage:

How much power will I need? If loads were all resistive, this would be an easy calculation. However, many of the residential loads contain inductive and capacitive properties. These include well pumps, heating/cooling plants and refrigeration units. Small electrical appliances and radio equipment that utilize transformers are also inductive. All of these come under the classification of "reactive power load." This provides a complex load for the generator. Motor starting currents must be obtained and included in the overall power requirement.

Power distortion:

All power generators provide alternating sinusoidal current with some distortion. This specification is provided by the generator manufacturer and should be less than 4% at rated load. Values greater than 4% indicate poor generator design. When the residential load is applied to the generator, the distortion will become a greater value.

Power factor:

This is the cosine of phase angle difference between the voltage and current expressed in degrees. As an example, a 30 degree phase angle difference would be $Pf = \cos(30 \text{ degrees}) = 0.866$. The power factor will always be less than 1. Calculating consumed power would be calculated:
Consumed power = (voltage 240) X (current 20 amperes) X (power factor 0.8) = 3840 watts.

Voltage:

Most residential generators are designed for 220/240 VAC service. Portable generators also include receptacles for 120 VAC and a DC output for recharging the 12 volt storage battery utilized in electric start models.

Frequency:

The nominal frequency within the U.S. is 60 Hertz. Generators rarely will give this desired frequency but will generate within a frequency tolerance of +/- 1 or 2 Hertz. A generator frequency outside the acceptable system limits will inhibit the transfer switch from transferring to the backup generator. This is done to prevent damage to equipment with motors that would overheat and be damaged from an under-frequency condition.

Pickup voltage:

This is the voltage point at which either the utility or generator voltage becomes acceptable.

Dropout voltage:

Likewise, this is the voltage at which either utility or generator source voltage becomes unacceptable.
Note: Pick-up/Drop-out voltage hysteresis is designed into the system to prevent the

generator cycling on and off.

Under voltage:

A voltage that is below the acceptable voltage limit.

Time Delays:

Engine start: This is the wait time after utility power is lost and the generator is started, typically 3-6 seconds. This prevents nuisance generator starts upon momentary power losses.

Backup power voltage dip: This delay prevents the Transfer Switch control from disconnecting the generator if added power loads and instantaneous high currents cause a temporary transient voltage dip.

Transfer to backup power source: This allows the generator to start, warm-up and stabilize.

Engine cool down: This delay permits the generator to run at no load to cool down before stopping to extend the life of the generator.

Re-transfer delay: This delay waits after the utility power is restored and has become stable.

Typical Household Appliance Load:

Appliance	Running Watts*
*Refrigerator	800-2000
*Electric Stove (one element)	1000-2000
Microwave Oven	1000
*Electric Furnace	>9000
*Air Conditioning (12K BTU)	1500-2000
Electric Water Heater	4000-5000
**Submersible Well Pump (1 HP)	1500-2000
*Sump Pump	500-700
Home Security System	25-100
Computer & Monitor	300-800
*Garage Door (1/2 HP)	750-1000
Minimal Lighting	60-400
Additional Lighting	500-2000
Coffee Maker	800-1200
Radio	20-100
Television	200-500

* Allow up to 6 times the listed wattage for starting power requirements on these selected devices. Note, all loads will not turn on at the same time.

** Review pump manufacturer's power requirement

References cited:

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NEC/NFPA 70, 1999, Article 220
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September 29, 2003
CBS "Aging Equipment Means Trouble for Utilities," August 5, 2006

Acknowledgements:

The author wishes to thank Dan Scheffer, John Hayes and Scott Hinks, for all contributed valuable insights, technical guidance, and suggestions. Also, ASCO Power Technologies, L. P., Florham Park, NJ for their technical information and photographs used in this article. Home generator photograph courtesy Kohler Corp. Portable Generator photograph courtesy Gillette Generator Inc.

Gregory Smith is a Senior Electronics Technician with ASCO Power Technologies, a Division of Emerson Electric, and holds FCC Amateur Extra Class License WB2PPQ.

Monitor Earth Orbiting Satellites - The Easy Way

VHF and UHF radio waves usually propagate in straight lines with limited distance. Thus they provide reliable line-of-sight communications. On occasion, ionospheric conditions allow radio propagation of over 1,000 miles. However, this propagation is unpredictable and limited to just a few minutes or hours – not exactly reliable long haul communications. But it makes for some exciting ham radio QSOs and monitoring. I remember talking with hams in Nebraska, Arizona, and even the island of San Salvador from my New York location on 50 MHz!

Today, another source of exotic VHF/UHF radio signals is via earth-orbit satellite. Many of these satellites carry amateur radio repeaters/transmitters and they can be surprisingly easy to intercept ... with the help of an excellent website.

❖ Getting Started

The required hardware needed to monitor earth-orbit satellites is surprisingly simple. When a satellite is directly above the listening location, just about any scanner receiver will do the job. Of course, the receiver must be capable of covering the satellite's downlink frequencies (the frequencies that the satellite uses to transmit back *down* to Earth). Downlinks are commonly, but not always, centered around 121 MHz, 436 MHz, 145 MHz and, at the low end of the spectrum, 29.4 MHz.

Clearly, our receiver/scanner must cover the above frequencies as a minimum. Most of the ham satellite transmissions will be narrow FM modulation. Some use single sideband as their mode of transmission. In addition, many satellites will use a CW mode to transmit Morse code characters that act as identification beacons. Therefore, scanners with user selectable modes will be the most versatile.

The usable sensitivity specification of the receiver is always a factor. Aim for a sensitivity of less than 0.8 microvolts (uV).

Since satellites do not adjust their orbits to our schedules, unattended monitoring can be an important feature for the working crowd. Receivers with computer control and logging capabilities make unattended monitoring possible. Of course, automatic audio capture capability is a necessity. But live satellite monitoring is where the excitement is.

❖ The Sky Hook

As important (in fact, some may say *more*

important) as the receiver is the antenna. If you use a wide band discone antenna for your usual scanner monitoring, this will work fine. It may have lower signal capture when the satellite is near the horizon.

A turnstile antenna gives excellent overhead and horizon coverage. But it does not have the broadband coverage of the discone. Instead, the turnstile is "cut" for a specific frequency. Some consider the turnstile the optimum satellite-receiving antenna.

A Helix antenna, another tuned antenna, is great for higher frequencies, but it's very directional. Therefore, this is not the best choice for following a rapidly moving dot in the sky.

Don't hesitate to try anything from a J-Pole, to a dipole, to a piece of wire. Each antenna system will have different signal capture characteristics, especially when the satellite is at the horizon. Even handheld radios, with their whip antenna, will allow some degree of basic near-overhead satellite monitoring.

❖ When to Listen?

In order to determine when we should listen, we first must consider the complexities of the orbit of a given satellite. The orbit is dependent on many factors, including the initial launch and orbit insertion parameters. Next, consider orbital decay, which constantly modifies the orbit. You can imagine that in order to find the position of satellite at any specific time, we require calculations that cannot be done in our heads.

Add to this complexity the need to overlay the position of our listening/observing location on a rotating Earth. A computer is perfect for the calculations. Before the advent of the PC, I remember performing lines of calculations with pencil and paper for just one pass. Programmable calculators helped. For one satellite it's possible to calculate a few orbital passes, but performing it for ten or twenty satellites ... not fun! But now there is a website that does all the hard work for us.

❖ Heavenly Resource

Start by looking at the topics listed on the Heavens Above home page at www.heavens-above.com, Figure 1. This website is a great resource for backyard astronomers as well as for satellite monitors.

In Figure 1 you can see a drawing of the current orbital position of the international space station, ISS. Similarly, we can access real-time

Heavens-Above Main Page

Configuration
Edit location (currently Concord, 43.2080N, 71.5380W)
select from database or edit manually
Registered user login | Why register?
Create new user account
Subscribe to our AvantGo channel

Satellites
10 day predictions for: ISS | Genesis-1 | Envisat | HST
Daily predictions for all satellites brighter than magnitude:
(brightest) 3.5 | 4.0 | 4.5 (dimmiest)
Iridium Flares
next 24 hrs | next 7 days | previous 48 hrs
Daytime flares for 7 days - see satellites in broad daylight!
Spacecraft escaping the Solar System - where are they now?
Radio amateur satellites - 24 hour predictions (all passes)
Select a satellite from the database
Height of the ISS - how does it vary with time



Figure 1- Heavens-Above.com homepage. You'll want to bookmark this one.

positional data of a number of satellites carrying amateur radio repeaters. These satellites take transmissions from earth-based hams and retransmit them on a different frequency. But being hundreds of miles above the Earth, the distance between these conversations can be thousands of miles!

Add the exact location of your monitoring site using the link in Figure 1. Heavens Above will now display orbital passes which will be visible/listenable at your site. It's that easy.

The Site is FREE: Any Internet user can access the data on this site without registering. However, the registration is free and you can create a database of your personal information including a number of observation locations.

The site has an excellent explanation of the geometric basics of observing an orbiting satellite from earth, see Figure 2. For radio monitoring, two parameters – altitude and azimuth – will be of primary interest.

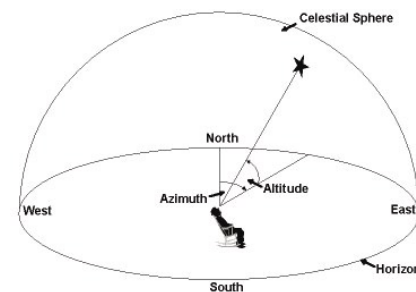


Figure 2 – Diagram depicting the two important parameters azimuth and altitude.

The azimuth parameter indicates in which compass direction the satellite can be found. Azimuth data can be used to predict the effect of radio wave obstruction, such as from mountains or tall buildings. It's also useful for the alignment of directional antennas such as dipoles.

The altitude is measured in degrees and tells

What's NEW

Tell them you saw it in Monitoring Times

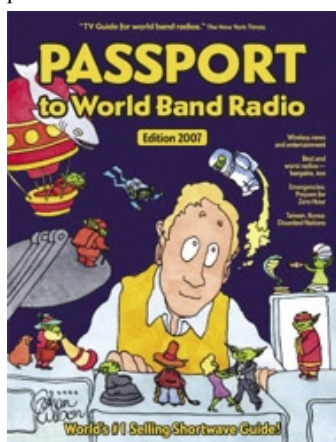
Passport to World Band Radio 2007

Looking for a good reference guide to complement your shortwave sessions? You're in luck! As the DX season continues, radio listeners are scrambling for the newest edition of *Passport to World Band Radio*.

Opening features focus on Asia beginning with *Taiwan: China on the Edge*, followed by an in-depth look on *Korea: Ancient Kingdom Makes Waves*. If you're a beginner, don't miss the "Getting Started" articles including: setting your world clock, best times and frequencies for 2007, best shows, and don't forget the *First Tries: "Big Ten" Catches*.

The book continues an annual feature, a large section covering *How to Choose a World Band Radio*, including shortwave portables, table tops, recorders and antennas in various price ranges.

The *Addresses Plus* section contains by-country listings of addresses, key contact personnel, website and email addresses and verification policies. *Voices from Home 2007* is a by-country section listing shortwave frequency schedules based on current and future predictions.



Passport's famous blue pages contain a graphical, by-frequency listing of county/stations (including time on/off and language information) to complement your band scanning. Because of seasonal frequency adjustments, no reference guide will remain a definitive source for the entire year; however, *Passport* includes frequencies contributors

have previously observed being active on a predictable basis.

Passport 2007 continues to set the standard among hobbyists, and remains a good reference guide for advice, features, receivers, antennas and seasonal frequencies. *Passport to World Band Radio 2007* (BK-18-07) is available through Grove Enterprises www.grove-ent.com (or) 1-800-438-8155 for \$22.95 + \$3.00 P/H.

—Gayle Van Horn

84th ARRL Handbook

Every radio amateur – and most professional technicians and engineers – know that the *ARRL Handbook* is the ultimate reference for applied RF electronics. First issued in 1926, the *Handbook* has evolved into a lavishly illustrated, encyclopedic publication containing a vast array of subject areas.

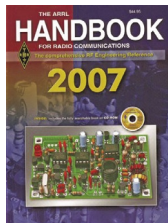
Now weighing in at 4 pounds and measuring 8-1/4" x 10-3/4", this 1100 page tome distributes its wealth of information among 26 separate chapters.

Subjects include tutorial electronics, RF, analog and digital design techniques, receiver and transmitter construction projects, accessories, component specifications, troubleshooting techniques, antenna design, satellite communications, test equipment and procedures, station layout and much more. Many of the projects include PC board layout templates.

This edition is also fully searchable via the accompanying CD-ROM. Order now and receive, while supplies last, a commemorative reprint of the January 1942 issue of *QST* magazine which contains the order to suspend amateur radio activities during World War II, mandated the day after the attack on Pearl Harbor.

Order hard cover #9779 (\$59.95) or soft cover #9760 (\$44.95) from: ARRL, 225 Main St., Newington, CT 06111-1494 or from the web at www.arrl.org.

—Bob Grove



208 It Was Great—Radio Luxembourg

In its heyday it was called "The Station of the Stars." Even today, Radio Luxembourg evokes fond memories of yesteryear by radio enthusiasts who affectionately call the powerhouse of Europe *Radio Luxy*.

I recently completed reading a fine nostalgic look by former engineer Alan Bailey, entitled *208 It Was Great—Radio Luxembourg*. I found it an informative, behind-the-scenes glance at the station, as well as anecdotes of personnel he worked with, visiting celebrities, and interviews.



During the Swinging Sixties, the British pop scene was bursting with vocal groups, solo artists and instrumentalists, brought to the European audience and beyond by listening to Radio Luxembourg. Teenagers listened to the latest hits on the café jukebox and U.S. servicemen tuned in to "the loudest thing in Europe" on shore and on board ships. The Beatles, besides being pirate radio fans, preferred *Radio Luxy* as an alternative to BBC radio, and it was Radio Luxembourg that often got exclusive interviews with the fab four.

The Swinging 60s and Beyond chapter reads like a who's-who from the entertainment industry of celebrities visiting the station, including the "weirdest personality ever to grace the Luxy studios" – Tiny Tim! *The Presenters* takes a look at the people in the station's production department, including a focus on the late Liverpool John Peel, Tony Blackburn, and the antics of the station DJs. Mr. Bailey also

enlightens the reader on the zany DJ Jimmy Savile and the masterful Monty Python.

Today's Radio Luxembourg retains its proud reputation and deservedly so. The station is still active on medium wave and FM, and with the advent of digital radio (DRM), ole' Luxy will remain an important voice in Europe.

208 It Was Great—Radio Luxembourg is an interesting glimpse at the author's career and Europe's powerhouse station. Thirty-nine photos spread across ten chapters will keep readers glued to the pages. Thanks, Mr. Bailey, for a job well done!

For more information and pricing, please refer to: www.208itwasgreatradioluxembourg.co.uk/; info@208itwasgreatradioluxembourg.co.uk

Oh yes, and if you really want to know "how many grooves does the average LP have?" you will have to finish the book!

—Gayle Van Horn

New Equipment for 2007

Here are several new radios to watch for in the first quarter of 2007. We'll have more information for you in coming months, but until then, follow the suggested links. The only one which had received FCC certification at presstime is the Ten-Tec transceiver. Thanks to Dave Zantow N9EWO (www.ticon.net/~n9ewo/) for the tips!

- ICOM R9500 5 kHz-3335 MHz receiver - For information, watch www.grove-ent.com/r9500.html
- JRC NRD-630 DSP based HF receiver 90 kHz-30 MHz <http://www.hamradio.co.uk/pdf/IRD-630.pdf>
- RF Space SDR-IQ 500 Hz-30 MHz USB powered software defined radio www.rfspace.com/sdrig.html
- Ten-Tec Omni VII transceiver 500 Hz-30 MHz receive <http://radio.tentec.com/Amateur/Transceivers/TT588>

Books and Equipment for announcement or review should be sent to What's New, c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC, 28902. Press releases may be faxed to 828-837-2216 or emailed to Rachel Baughn, editor@monitoringtimes.com.

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Ads for Stock Exchange must be received 45 days prior to publication date. All ads must be paid in advance to Monitoring Times.
Ad copy must be typed for legibility.

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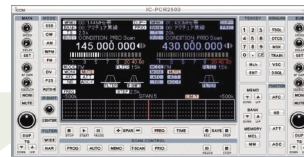
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